VOLUME 9 *The* WIRELESS AGE NUMBER 8

In Our Opinion

THERE are marked advantages in high, or, radio frequency amplification over the low, or audio frequency method of amplifying in reception. Audio frequency has its place in land wire communication and in the modulation circuits of a radiophone transmitter, but when amplification at the radio receiver is desired it is certainly not good engineering practice to first rectify the incoming high-frequency current and then amplify the rectified current at audio frequency. For one thing, static and other undesirable noises are of audio frequency, and when that form is used in reception they are amplified to the same degree as incoming signals. When radio-frequency is used, static, induction and other disturbances are amplified only slightly, if at all. This one big advantage of high-frequency amplification appears to be sufficient reason for its general adoption.

Radio Frequency Amplification

There is another reason of equal importance, however.

The detector tube of a receiving circuit rectifies, and so makes audible incoming high frequency signals of either continuous or discontinuous waves. On weak signals, however, the tube will function only to a certain point. Where signals are too weak to be detected and rectified by the detector tube, they are lost, and no amount of audio frequency amplification will help matters. The proper thing to do, therefore, where reason or desire exists to warrant it, is to amplify the radio frequency of incoming signals, then detect it, and again amplify the resultant audio frequency.

A number of textbooks contain diagrams of radio frequency amplification circuits, but while all of these will operate satisfactorily on frequencies from 500,000 down (or wavelengths 600 meters and up), there has been only one circuit up to the present time which will operate efficiently on frequencies in the neighborhood of 1,500,000 (200 meters), that being the resistance-coupled super-heterodyne circuit developed by Armstrong and used by Godley at Ardrossan. This super-heterodyne circuit, while affording marvellous amplification, calls for the use of so many tubes that its use is practically prohibitive to the average amateur.

In the super-heterodyne arrangement used by Godley (which, by the way, was not unduly elaborate), nine tubes were used for spark signals, and an additional external heterodyne, ten in all, for C.W. reception. This number of tubes is required because a considerable proportion of the incoming energy is lost in the transfer coils which this type of circuit makes necessary between the high and intermediate circuits and again between the intermediate and low, or, audio-frequency circuit. Roughly, this arrangement, while extremely sensitive and reliable, is beyond the average amateur, for, in addition to first outlay for assembly and installation, there is an exceedingly heavy drain on the facilities for filament heating, the average current for the number of tubes used by Godley being 10 amperes.

The new iron-core transformers which are now available to the market have undoubtedly solved the problem of amplification at high frequencies, having been designed to work on a broad band of frequencies, without tuning, at which most amateur operation is carried on and also over a wide band of lower frequencies. The circuits are similar to those used for audio frequency amplification.

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COMMON sense, and the Fire Underwriters, both dictate that with the coming of summer every operator of a transmitting or receiving radio station employing an outdoor antenna should provide some approved form of protection from lightning. An antenna is no more of a menace during an electrical storm than a telephone wire, an electric light wire, or even the wiring of doorbells and other interior communicating systems. Yet the menace exists and the possibility of damage should be reduced to a minimum.

Protection Against Lightning

There are several ways of protecting a building, the antenna lead-in may be disconnected and the end dropped to the ground, outside. But this is not a good method unless each time the antenna is disconnected the lead is clamped to a ground pipe in order to provide a path of low resistance. When the antenna lead is merely thrown on the ground, a high resistance exists between the antenna and ground, which is liable to cause a lightning discharge to jump from the antenna to other nearby objects which offer a path to ground of lower resistance.

Two devices for lightning protection have the approval of the National Electric Code—the manually operated switch and the grounded short gap.

With the manually operated lightning switch thrown to the grounded position, heavy electrical surges induced in the antenna system by nearby lightning discharges pass swiftly to ground.

The grounded short gap operates automatically. It consists of two electrodes held in a fixed position in a sealed chamber from which the air has been exhausted, and it has been found that inductive currents readily pass through the gap in the thin air in the chamber.

But whatever the device, a good ground connection should be provided. Two or three lengths of galvanized pipe driven at least four feet into the ground is a good arrangement; also metal plates buried in the ground, two or three feet below the surface; or, the connection may be made to a water pipe. The conductor running from the lightning protective device to ground should be not smaller than a No. 4 copper wire, copper tubing ¼ inch outside diameter, or copper ribbon ⅜ inch wide. The conductor must be mounted on insulators and must be at least 5 feet clear of the building. All connections should be soldered.

There are very few cases on record of lightning having actually caused any damage to radio stations. The chances are no greater than for any other building. The impressive total of 600,000 radio installations in American homes at the present time at least calls for a word to the effect that a well-grounded antenna is not only itself protection again the effects of lightning, but is also a protection to the building on which it is installed.

THE EDITOR.

Meet the Opera Star Who Calls Radio "Weird"

SPEAKING for the first time in an interview directed especially toward radio listeners, Marie Sundelius, for six years a star in the Metropolitan Opera Company, declares the future of radio will reveal a heavy demand for the very best in music. Read her interesting prophecy on page 29

Listeners Want to See Her, Says Dainty Singer

RADIO does not raid the theatrical box office according to Vivienne Segal, charming musical comedy artist, shown here. This winsome songbird, unable to meet her appreciative radio audience, was glad to express her frank views for them, and this she does in an interview which appears on page 31

Prima Donna Introduces Radio to the Stage

OLGA STECK, petite and beautiful star of the new musical comedy "Sue, Dear" is billed as "A Girl You're Sure to Love," which seems specially applicable to radio fans to whom she expresses gratitude for their letters of appreciation, in an interview on page 35

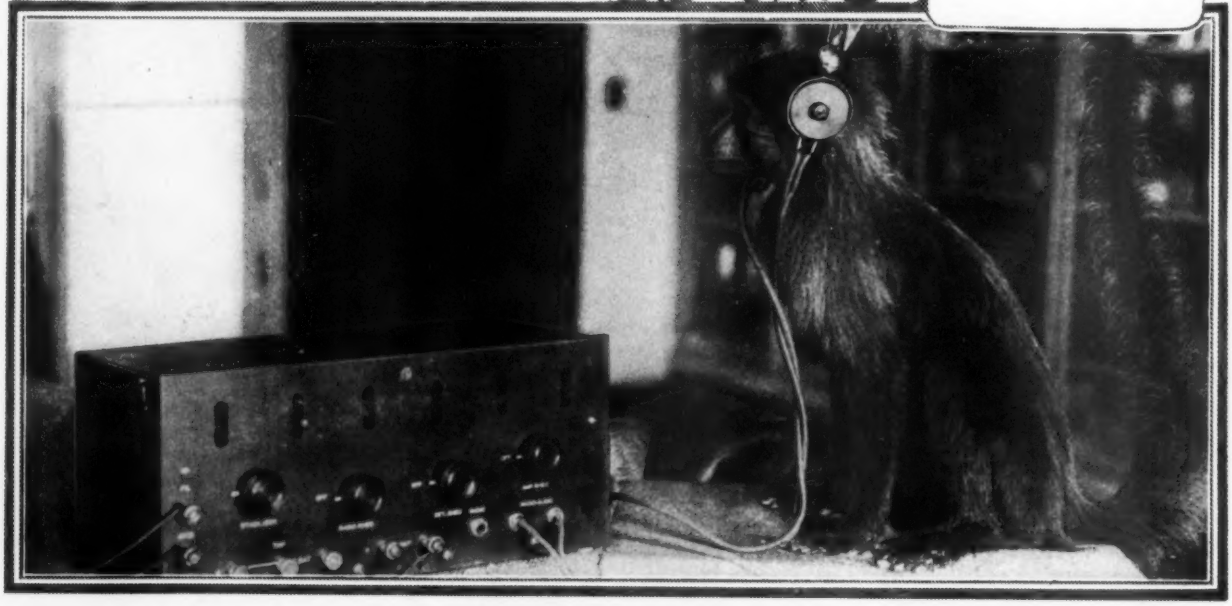
Know This Friend of Phonograph and Radio?

LAUGHTER—that's Billy Jones' creed. Billy, seen above with his characteristic smile, made 'em laugh from WJZ. And the reason for his success is given in the interview on page 39. Jones has no peer on the phonograph or on the air as a humorous entertainer and a singer of popular songs

Radio Appeals Alike to Beauty and the Beast

From her room in a New York hotel, Ethel Hart endeavors to hear Brookline, Mass., where someone near and dear is trying to get a message "across"

And radio brings joy to Jiggs and Maggie of comic page fame. At last a way has been found to make Jiggs stay home



Even the beast listens. "Jocko da monk" has learned something new, and like the rest of "Darwin's descendants", he's a radio fan. It is not wholly clear whether Jocko is listening to a Russian ballad in the original, or to some choice bit of jazz, but whatever it is, his quizzical expression doesn't disclose his opinion of radio as a counter-irritant to monkey itches

Official Washington Lends Eager Ear to Radio

Latest of the diplomats from overseas to install a set is H. H. Bryn, Norwegian minister in Washington

American officials, however, were first to install sets in their offices. The photo shows that of Edwin Denby, Secretary of the Navy

Not content with a set in his home, Secretary of State Hughes had this one placed in his office in the State Department

General John J. Pershing, Commander of the American Army, fell an easy victim to radio telephone broadcasting, for he can combine pleasure with duty in following closely the development of air communication, so vital to mobile forces in time of war

And so did Herbert Hoover, Secretary of Commerce. He should make a good job of governmental regulation, for he is a genuine radio fan and is getting first hand knowledge of the problems associated with the limitation of wave length bands and possible resultant confusion

Radio Penetrates Even Behind the Calcium Lights

In the movie studio Gloria Swanson finds time to listen in between the "shooting" of scenes

And in her dressing room between acts Jane Richardson, star of "Just Because," hears broadcasted programs

Everyone knows the Dolly Sisters. They are seen here at a Brooklyn theatre where the famous dancing pair listened in and caught the popular fever

In All the Realm of Childhood Radio Is King

Because he is only four, the young son of Walter Garvey of Fordham, N. Y., tries to send on a receiver

The modern child finds no terrors in the bath. Thomas and George Mahlia of Brooklyn enjoy themselves in a manner which is self-explanatory

Little Dorothy Hasselbrook's Daddy ran out of bedtime stories just about the time radio became popular—then the problem was solved to Dorothy's complete satisfaction

A radio set will help pass the time when the fish aren't biting says Jimmy Dunn—a young convert to radio

The Permanency of Broadcasting

How A Scientific Novelty Developed In Eighteen Months to a Necessary and Popular Service—Present Limitations and the Line of Future Extension

By H. P. Davis

IT is always unsafe to assume the role of a prophet, but the writer presumed to take such a chance more than a year ago when in a published article he made the following statements:

"The adaptability of the radiophone to broadcasting reports, news, entertainments, concerts, lectures, etc., creates a field particularly its own, and it is reasonably certain that the future will see many changes in the present accepted methods of conducting such functions and entertainments. It is quite possible that especially constructed transmitting rooms will be provided for such purposes, so that voices and music will be broadcasted through unbounded areas and listened to by invisible and widely distributed audiences of vast numbers. The same opportunities would thus exist for the country dweller as for the city resident, and inmates of hospitals and sanitariums, and sick people and invalids in the home would have opportunities for pleasures and diversions now denied them. A transmitting system of this character would have the further great advantage of doing away with the necessity of appearing in person in public halls and auditoriums, the capacities of which at best are quite limited.

"The importance of reaching such tremendous numbers of people, with practically no effort, offers great possibilities for advertising and the distribution of news and important facts, and in reality introduces a 'universal speaking service.' It is not unreasonable to predict that the time will come when almost every home will include in its furnishing some sort of loud-speaking radio receiving instrument, which can be put into operation at will, permitting the householder to be in more or less constant touch with the outside world through these broadcasting agencies.

"The field of radio application is practically unlimited in the important affairs of the world, and this development will mark one of the great steps in the progress and evolution of mankind."

What is the situation today? In a period of wide-spread business depression, and thus a most inauspicious one for a new venture, radio is a topic of as universal interest as the weather; and the spell of radio broadcasting especially is becoming world-wide.

It is probably a fact that no facility or service has ever received such instant response from the public or has grown so fast in popularity, and at a time when the public buying power was generally believed to be nil, a market has been developed which is limited only by the ability of manufacturers to supply apparatus.

Civilization progresses in direct ratio to the advance in communication and transportation facilities, and the public

H. P. Davis, Vice-President of the Westinghouse Electric and Manufacturing Company

is quick to recognize and seize upon, and make use of, any new developments in either of these services. In a sense, radio broadcasting as a service has opened a new field for public communication, and what has been more or less of a scientific novelty, or possibly a visionary dream, has become almost overnight an accomplished fact and a wide-spread and necessary popular service.

It is fascinating in its mystery, and this is undoubtedly one of the greatest attractions in its first appeal to the imagination. But it is destined to be something more than a fascinating novelty, for as the possibilities of radio unfold we see before us a wonderful and permanent public service comparable with other modern facilities and conveniences in its ability to make life easier and better. Radio annihilates distance, reducing it to nothing, since the element of time scarcely enters into the speed of the transmission and can be entirely disregarded when it is possible to encircle the globe in a small fraction of a second with a radio wave.

We all realize that the interest of the public is fickle and that the mystery of this wonderful agency will wear off as it ceases to be a novelty, but even admitting that, the element of permanency is present in radio broadcasting. This is evidenced by the thousands of letters that have been received from the radio audiences, of which the following are samples:

"I'm an old lady, almost blind, 75 years old. My youngest grandson, an 18-year-old senior in high school, installed one of your radio sets for me last Monday, March 20, and I have enjoyed three fine concerts and two noon-hour services at Trinity Church. You are doing much good and giving great pleasure to the many, many 'shut-ins' like myself."

"We are located up on the lonesome mountains of Southeastern Kentucky. We listened in on your program last evening, and we certainly appreciate this very excellent music. We are about 200 miles from any large city, so you will understand why this is such a great treat to us and our miners."

"We enjoyed every bit of Tuesday night's program, but especially the talk given by the 'Bird Man.' We are country people and you know we live very near to nature, so his talk of the birds was very interesting to us. We are thankful to have lived to see this possible and we are surely indebted to you people who make it so. Being elderly people and during the winter's bad weather not often able to get out, it is a very great thing for us to be able to enjoy such things by radio."

Half our population resides in the country, and conditions similar to those recited in these letters will prevail. But consider also what it means to the sick, the infirm and the aged, even though they may be residents of the cities.

The broadcasting of church services alone, which was initiated by KDKA, the Westinghouse Electric and Manufacturing Company's broadcasting station at East Pittsburgh, Pennsylvania, would in itself be sufficient to make radio broadcasting permanent and invaluable. This service met with instant response, for it was at once unique and compelling it its appeal to people of all ages, classes and denominations, and is proving to be one of the greatest publicity and beneficent features ever presented; it is doing more to enlarge the church's sphere of

influence than any medium heretofore utilized.

As radio broadcasting is developed today it has one feature not possessed by any other service in existence, and except for the comparatively small cost of the initial installation, it is without favor and without price. Everyone can occupy a "free reserved seat" at any and every radio broadcasting performance. This is an important fact not generally recognized, for while one large electrical manufacturing company initiated the service and several companies are now maintaining broadcasting stations, the only financial support they receive for this costly service is the possible profit from the sale of receiving apparatus of their manufacture; but there are hundreds of other manufacturers and dealers who are manufacturing and selling receiving apparatus also, who do not support this service in any way whatever and who, because of this service, reap large benefits without exertion or expense on their part.

It is doubtful if there is any way in which this service can be made a direct revenue producer for such companies or institutions as foster it. Recognizing this fact, there must then be developed sufficient indirect value to those maintaining radio broadcasting stations to make it profitable for them to operate and develop this service.

To the uninitiated it probably seems a simple matter to install a radio transmitting outfit and to broadcast music and speech and thus call the installation a broadcasting station. KDKA has now been in operation

The specially constructed studio at KDKA station which realizes the prophecy of a year ago that such rooms would be provided for broadcasting stations

The transmitting microphone at WJZ into which great artists sing represents months of laboratory research and operating development

since the early part of November, 1920, and as the pioneer in radio broadcasting service, has made history in the development of the radio broadcasting art. It will be difficult for anyone now sitting at a receiving instrument to realize the amount of development work and expense that has been attached to bringing that station to its present effectiveness, but I am quite sure that if it were possible to compare what was considered good broadcasting a year and a half ago, and what is being transmitted today, it would at once be evident that a wonderful improvement has been brought about.

There are still considerable limitations in the ability of the available broadcasting apparatus to transmit talk and music tones true to life, and ultimate perfection of trueness is only attained when the listener receives what is broadcasted in the natural reflection and without distortion. Much thought is being given and work done to reach this perfection, and it is the writer's belief that very material steps of advance in this will be forthcoming shortly.

Our apparatus and means for radio broadcasting are today undeveloped, and if greater perfection is to be attained, confusion, with resultant public disgust, must be prevented; so protection of some kind is due those who foster and develop this service.

Recognizing that inefficient and interfering service will not be tolerated, the Government has already taken preliminary steps to formulate regulations with a view to materially improving this situation, in the recent conference held in Washington under the auspices of the Department of Commerce. As the conditions of service and the requirements of the public become better appreciated, means will be found to attain this end.

There are comparatively few available wave lengths in the ether, and to encourage this very necessary development these ether wave bands must be allocated and administered with much discrimination and care. Only companies or institutions with competent research and operating staffs, and financial means to back them, can possibly support this service in a proper manner and accomplish this most desirable perfecting of radio broadcasting. In other words, radio broadcast-

When W. J. Bryan speaks nowadays over the radio a quarter-million people hear the great Commoner

ing is an infant industry and it must have protection, and if this is properly and conservatively done we shall hold the public support and shall look back in a very short time in amazement at what has been accomplished.

It is unfortunate, however, that this imperfection of the sending apparatus is not as fully realized as it should be, with the result that many new broadcasting stations are being planned which must necessarily give only mediocre results. Not only is the ether going to be crowded, but crowded with discordant and disagreeable performances.

I feel that this period is going to be the test of the public's approbation. The growth of the public approval has been too rapid to be healthy, as it outstrips the growth of the development of the art, and while the fascination of broadcasting is the impelling force now, the period of development of not only the apparatus, but of the service itself is going to require patience and forbearance on the part of the public.

The same situation confronts this service as has been encountered in all other innovations or great steps of progress, and that is the attitude of those in allied established activities to look upon the newcomer as a rival which is to be regarded with suspicion and gauged in a competitive sense.

It is easy to see from what has been said herein that there is little or no revenue-producing opportunity in this service, and that the value attached to it is almost wholly one of advertising. Until this is realized and appreciated by those who must furnish the talent for the program, however, more or less difficulty will be experienced in perfecting and broadening the program service, and the attitude now being met on the part of a few lecturers, artists, theatrical and concert managers who refuse their assistance for fear of adversely affecting their box-office receipts and of reducing their earning capacity, must be converted to an appreciation of its advertising value — not as a destructive, but as a constructive agent; for if advertising in any way has been a benefit in helping the growth of such undertakings, the far greater advertising possibilities in radio broadcasting must undoubtedly bring greater returns for the amount of energy expended than any other agent yet available.

Undoubtedly, however, if this service is to fulfill its mission, ways will be devised to overcome this difficulty; for in this case as in other cases of unusual developments, it will eventually be found that, instead of being a competitor, radio broadcasting becomes a source of development and extension to the other arts. A service which offers such possibilities must in the future wield a tremendous influence, and overcome obstacles which now beset its path.

In broadcasting, radio has found its greatest usefulness and its most important field of application, and it is destined to become a basic public service. The road is a rough one, however, as many of us who have been intimately connected with its development are realizing.

Radio and the Phonograph Dealer

Abstracts of an Editorial From "The Talking Machine Journal," Showing How Radio Will Help the Phonograph Business

THE big new idea in the talking machine field is Radio-Telephony. Like all big new ideas it is fraught with blessings or — blow-ups. When we contemplate the fact that in a time when all other businesses were moving with extreme slowness, or were actually at a standstill, radio-telephony sprouted up to a towering height in just a few months, we must admit that it has great force in it. But on the other hand, has it real strength and staying power? Granted that it has stability and a future, what does it mean to the talking machine dealer, and how should he connect himself with it? How should he plan today?

In considering radio and its possibilities, merchants should bear one thing steadily in mind—that they are in the phonograph business. The phonograph business is firmly established as a part of the commercial structure of this country. The recent census department report gives figures showing that only the automobile business rivals the phonograph business in the volume of sales — with two and a quarter million machines made and marketed in 1919 — and over two-thirds that number produced last year, admittedly an off year. Hence it becomes a question of the old and established business brother holding out a helping hand to the newly arrived child of commerce.

The point of view should be that the dealer should interest himself in the possibilities of radio because it can help his phonograph business, and, viewed from the other side, because he is the one merchant who is today properly equipped in his store and his business experience to distribute this type of goods and more particularly the type of goods that is being rapidly developed, namely the cabinet installed sets, particularly those combining phonograph and radio equipment.

At present there seems no chance for competition between broadcasted radio music, and the fine reproductions of artists to be had on the records. A fraction of the family's "listening time" may be absorbed by the radio outfit, but in general what they hear will stimulate a desire to own a smooth and artistic reproduction of the selection that they can put on their phonograph and hear through without interruption at any time they wish. This is without prejudice to the fact that radio contributes many individual and interesting features of its own to the home entertainment. Phonograph dealers should take hold of radio both for its present and for its future, going ahead conservatively and making sure that they have allied themselves with only standard and reliable lines. Plunging in the ordering of goods is not justified. The point is not so much to get goods as to get the proper kind. A few bad outfits will damage the entire proposition in your neighborhood. Radio is here to stay, and the dealer who proceeds cautiously with it, from the point of view of developing his phonograph business, will make more and better sales than the one who rushes in without proper consideration of the pitfalls as well as the profits.

Scene: Movie house in Kokomo.
Time: Nineteen twenty something.
Idea: Movie houses have installed radio. Three thousand get their music from Chicago orchestra.

We see the villain approaching the country lassie. Evil is written all over his face. The girl is frightened. He grabs her. They struggle furiously. Just as the fight is at its height, something slips in the music synchronizer and there bursts inappropriately forth from the radio receiver:

"Dapper Dan, der Pullman Porter man,
On a train that ran through Dixie."

Marie Sundelius Says:

"Radio is Helping to Make Musical America More Musical"

Metropolitan Opera Singer Tells Paul S. Gautier in an Interview That Radio Never Can Supplant Opera Because Opera Not Only Includes Song, But Action as Well. But Arias, She Adds, and Other Good Music, Will Be In Heavy Demand by Those Who Listen In

SEVERAL times from WJZ radiofans have heard Marie Sundelius, the Metropolitan Opera Company soprano, via the radio telephone. And they still are talking about the charm of those hours of entertainment.

It may be confusing to use the word entertainment in connection with her concerts over the radiophone, for that designation is so liable of interpretation by a hasty public as amusement of a less substantial or popular nature.

When Marie Sundelius sang, her selections were from operas, and a grateful, listening world thanked her for it. There is ample evidence to prove it — the hundreds of letters that come from the unseen audience to an artist it appreciates.

She showed me some of the letters when I went to see her in her apartment just off Central Park West, in the Nineties, in New York City. I wanted to be the ambassador of these thousands who "listened in," and to be able to visualize for them by picture and word as best I could, the star soprano they came to know in the brief space of an hour or so.

It takes but five minutes, by any correctly functioning watch, to feel that you have known Marie Sundelius for a long time. She puts you at complete ease, and when she makes a statement, or answers a question, she seems to put a reserve of vitality into it. When she smiles — well, it is a smile, one of the kind that would thrown light back into any shadow. Which is one way of saying that your first and lasting impression of the diva is one of a personality that fairly scintillates.

Country Not Unmusical

Marie Sundelius has an introspective turn of mind; and convictions; she knows the American people want good music.

"This country is not unmusical," she told me, "it is not really, as so many have said in the past, a country that likes only the popular songs.

"I have found that people will take the good things in music more eagerly than the other kind, if you will only give it to them. One summer I went

Marie Sundelius as Ah-Yo in "L'Oracolo"

to a boys' camp to sing. I was warned by good-intentioned friends, not to sing classical or operatic selections. They told me to sing the popular songs; the boys wouldn't understand any other kind; and they would not listen to the classics. I am glad to say I did not take their advice, and that the boys took to the operatic music like the proverbial duck takes to water."

It was at this juncture I mentioned that I wanted to know on behalf of my constituents—the radiophone listeners—whether a complete opera lends itself to the radio; more specifically, whether the difficulties of trying to broadcast an entire opera gave commensurate satisfaction.

"It is quite impossible to literally broadcast an entire opera and give satisfaction to the patrons of this class of entertainment," she answered, "because opera means not only song, but action.

"It is as easy, of course, to sing a selection from any opera over the radiophone as it is to sing any popular selection. But it is the sight in opera that counts heavily, being able to see the performers, their costumes, the wonderful scenery, and the action of the theme. You cannot project that over radio.

"But as far as being able to send good music over radio, that you can do, and that will be done more and more, for there is, and there will be to a greater degree, a demand for good music. Such a wonderful invention as the radiophone will help tremendously to make this good result possible. It is all helping to make musical America more musical."

The opera and concert star received letters from not only those who have seen her in a performance, but those who haven't, and who admit they had never taken much interest in opera until they heard her "on the air."

She laughed heartily when she told me about a friend, Dr. Joseph A. McPhillips, who lives in the same apartment building. They have been neighbors for about two years, but never once had the doctor heard her sing until the first night she broadcasted from Newark; then he heard her via the radiophone. She smiled at the thought of going miles away from home to have her neighbor hear her voice for the first time in the very building where she lived.

"Positively Weird"

"It is a wonderful invention," she said, "in fact, I think it is positively weird."

Marie Sundelius has been a Metropolitan Opera Co. star for six years. Before and after seasons she appears in concerts, throughout the country.

She told me an interesting thing. It seems she, born abroad, received all of her education in this country, most of it in Boston, which really is her "home town." It was in New England that she was a singer in her church choir, the same church in which were hung the two lanterns to notify Paul Revere that the British were advancing by land. This took place in the old church building, but though she sang in a newer church, it was before sociologically the "same" congregation as that of the famous Revolutionary Days, for her auditors were the grandchildren and great-grandchildren of those who attended it when this country was in the making.

Before I left she emphasized again, and she asked me to tell the listeners in words as emphatic as I could summon, that she knows that they want the best of music, and that she is confident that radio will do its share to implant this desire even stronger than it is now.

"Hello, Pa, I'm Half-Way To Europe"

THE shore-to-ship tests recently carried on between the America, bound for Europe and a station on the Jersey Coast, have proven so successful that it is probable many ships will carry on radiophone communications as a feature of their service.

Soon after its departure from New York, the America exchanged conversations with the Jersey station. This was continued several times a day during the long voyage. An operator especially assigned to the America noted the degree of clearness with which the messages were received during the trip and reported that news digests, music, and other messages, were received with fine distinctness.

A ship recently arriving from a South American port, while off Cuba, picked up New York, Pittsburgh, and Chicago broadcast. Trans-Atlantic passengers may soon be able to exchange greetings with relatives on shore two or three days prior to their landing.

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Political Opportunities

WHEN the next national nominating conventions for the Presidency come around again in June, 1924, a majority of the electorate will be in the gallery during the proceedings.

All the excitement, the partisanship, the tensity, as ballot after ballot is taken without result as candidates rise to greatness and fall to oblivion within an hour, will be transmitted to the American people by radio as directly as if they were in the great convention hall itself. The reaction on our political methods and manners is certain to be drastic, although the definite results are hard to predict. Certainly they cannot be for the worse.

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Radio's Relation to Theatre

THE radiophone, its relation to the theatre, what it is destined to become in the future, and numerous other angles form a topic of conversation at present in almost every gathering of theatremen. Everyone seems greatly interested. Virtually every day the radiophone is coming into use in connection with this or that—which keeps interest at high pitch.

How can the motion picture theatre owners best make use of this latest invention of science. This is the question in which showmen are primarily interested. And here is a suggestion from H. G. Stettmund of the Odeon theatre, Chandler, Okla., that furnishes food for considerable thought on the subject.

In a letter to Martin J. Quigley, publisher and editor of the Exhibitors' Herald, Mr. Stettmund writes:

"The radiophone is working wonders and it is practically in its infancy. I have written to several theatres who have installed receiving sets with loud speakers and they claim it has increased their attendance greatly.

"Would it not be a good idea to have one of the leading theatres in New York City, Chicago, Kansas City, Dallas, Denver, etc., to broadcast their music every day.

"The hundreds of small theatres in each territory could put in receiving sets and use this music in their own shows. Of course, there are a number of theatres that have their own music and play to their pictures, but there are hundreds using mechanical music.

"Let each exhibitor using this service pay $5.00 or $10.00 per month for this privilege. In this way the broadcasting theatre would soon get paid for their installation and a nice revenue each month. The payment by exhibitors would have to be on the honor system. There are possibly some who would use the service and not pay, but thank goodness they are greatly in the minority.

"The theatre using this service would soon have sufficient additional patronage to pay for their installation and derive a good revenue also.

"I hope the National Convention will take up this matter and see that something regarding this is done."

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Room and Bath with Radio Now

AS soon as the radio wave of popularity spread the first ones to recognize its commercial value as a medium of getting publicity were the hotels and cafes. Many New York cafes, prominent ones, too, have installed radiophones in their dining rooms besides the regular orchestra, and when no music is coming over the ether, the orchestra plays. Dances are held in such places by radio music, and as the country editor would say, a good time is had by all.

Several of the big hotels have been approached by dealers in radio equipment with a proposition to equip the hostelry rooms with radio receiving sets. The hotel men are hesitating. They want to—but—it would require more help, more watching of the rooms to see that the equipment is not purloined, and they question whether the value of the radiophone in the room would more than offset the difficulties which would naturally arise. They haven't said no, and so maybe our hotel room of the future will have not only a bureau, bed, and bath, but a radiophone as well. Oh, for the life of a traveling salesman!

Music by radio gives Agnes Ayres and Milton Sills an opportunity to dance between sets in the Paramount Studios in California

"Singing over the radio telephone certainly does not hurt the box office value of the performer," said the demure little Miss who is more thoughtful than her mischievous posture indicates

An Interview With

Vivienne Segal

By T. J. Dunham

Vivienne Segal is a home loving girl

"BUT it is the romantic side, just the very idea of being able to do it all, that really attracts me to it!"

If you are a regular at the theater you will recall—very pleasantly—the beautiful young woman out of whose bow-shaped lips the above words slipped.

She is Vivienne Segal, one of those fortunate, young, talented and earnest women — I should say girls — who are just commencing to peek over the hill and down into the valley into which shines a golden sun of success, flooding the sloping hills and the little homes with peace, happiness, and contentment.

And it should be mentioned the figure of speech is reflected in her. We were chatting in the quiet of her New York apartment.

What I wanted to get was an expression from one in a position to know as to whether or not singing over the radiophone hurt the box office value of a performer.

And I could think of no one better qualified to answer. Here was a girl who was gradually gaining a name on the stage, who has held important roles in musical comedies such as "Oh, Lady Lady," "Blue Paradise," "Miss 1917," "The Little Whopper," and others.

In one show she has been starred—the last one in which she played before she entered big-time vaudeville, where she will show until this Fall before again entering musical comedy. She admits frankly that the first — and thus far the only — time when her name appeared in electric lights in connection with a regular production, she stood gazing fondly at it, oblivious of the passing Broadway throng. I mention this to show how frank she is in saying what she means.

If radiophone singing were going to hurt anyone at the box office it would be one in such a stage of development as Miss Segal. She has not yet arrived at the Julia Sanderson degree of public popularity. But she is headed that way — and her radiophone work is proving one of the vehicles to speed the journey.

"It's the romance that get's me," she was saying.

"Think of sending your voice so that those hundreds of miles away will hear it as quickly as those in the same room. When I was asked to first broadcast I was delighted with the idea. It was distinctly novel for me."

She reviewed her career, which, though while she is still very young, has extended over slightly more than six years. And in all her work, she says, none received such wide "publicity" — don't confuse it with "popularity," — as her radiophone work.

That allowed me to bring up the subject I was interested in.

"Singing over the radiophone certainly does not hurt the box office value of the performer," she said emphatically. And she gave a decided emphasis to her statement with a very positive shake of her golden hair.

It's bobbed—that hair—and forms a pleasing background for a peach complexion, intelligent eyes, and expressive mouth. (Remember that when next you hear her over the ether waves.)

"As a matter of fact," she continued, "it does the opposite. It increases an artist's value to the box office. Those who listen to her want to see what she looks like, and when she appears in the local theater they go and feel a sort of personal, friendly interest in her which they would not otherwise feel.

" 'Oh,' they say, 'I heard her over the radiophone. I didn't know she looked like that.' That was the tone of a big majority of the letters I received. They said they wanted to see me, and would not lose the opportunity if I played a nearby theatre.

"That would seem like conclusive evidence. But it isn't all. Everyone is entitled to his or her opinion. But it seems to me that this idea that radiophone work will cut attendance at the theatre, likens very much to the time when phonographs were introduced. Everybody says this, and in my opinion they are right. Many theatrical men thought if a performer sang for the records the people who bought the records would not want to pay good money to hear the performer in a theatre. The opposite proved true. And the movies. There is always a place on the legitimate stage for a movie star, providing, of course, she has stage presence for the spoken drama."

ON one occasion when Miss Segal sang from Roselle Park station she discovered she was without an adequate supply of songs. In the emergency, selections she had never practiced were given her; she sang them at sight, demonstrating she not only is a talented girl, but is quick to overcome unforeseen handicaps of a kind those who listen in never hear about

London Amateurs Busy

LONDON is awakening to the pleasures of the radio telephone. That London should only recently have heard its first radio concert, and that special permission should have been necessary to stage it, shows how far behind England is in the radio game as compared with the United States. England, however, is beginning to realize that not only the United States, but also Continental countries, are leaving her with a lot of leeway to make up in wireless matters. Holland, for example, the scene of Florence Parbury's experiments in transmission, is now broadcasting news daily and has a local news service in which Stock Exchange quotations figure.

An agitation is being set on foot here against the "pettifogging restrictions" which, it is charged in radio circles, are responsible for hampering the amateur pursuit of wireless. Against the hundreds of thousands of amateurs operating in the United States, there are only something between 7,000 and 8,000 amateurs in England, it is estimated.

It is claimed that amateurs cannot get practice, and that wireless, if not fettered, would be as popular in England as it is in the States. The view held in radio circles is that the Post Office is not responsible in the matter of restrictions, but that they are a buffer between the public use of wireless and the old-fashioned notions of its use only for the Navy, Army and aviation.

Radio amateurs, however, are in hopes that better days are coming to them. The matter has been taken up in Parliament, where Sir Douglas Newton, who has had radio apparatus in his house for the last fifteen years, has questioned the Postmaster General. Sir Douglas Newton asked if he were prepared substantially to modify and relax, at an early date, the existing regulations, and if he would sanction the broadcasting daily of messages likely to benefit trade and industry, or of general public interest. In reply the Postmaster General said that the whole question was being referred to the Imperial Communications Committee, so that the views of the departments concerned might be obtained as early as possible. He added that he was himself entirely sympathetic with the idea.

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Germany's R.R. Radio

WIRELESS telephone instruments will be installed on a number of important German express trains, and receiving instruments will be placed in hotels and embassies, according to an announcement made recently.

Experiments have shown the practicability of it. Men engaged in the testing of the instruments were able to hold conversations with friends in Berlin from moving freight trains. The tests were made under the obsercation of engineers, military attaches and the diplomatic representatives of the United States and Sweden.

It is planned for travelers on express trains to reserve hotel accommodations by radio.

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Chinese Commercial Station

WHAT is presumed to be the longest commercial radio telephone circuit in the world has been placed in operation in China. Radio sets have been installed in Pekin and Tientsin, which are approximately ninety miles apart, and have been connected with the Government telephone lines.

In the past, Pekin has been virtually deprived of long-distance telephone connections with other cities in China, due to few interurban lines in operation out of the capital, in face of many demands for service. And the new radiophone circuit is the first large step toward simplifying China's telephone problems. The apparatus was provided by the International Western Electric Company and manufactured in the laboratories of the Western Electric Company, New York.

The sets are so arranged that when a telephone subscriber in Pekin wishes to make a Tientsin call, he will call the Pekin operator in the usual manner, and Tientsin is signaled over the radio channel. The Tientsin operator in turn makes the necessary connection and the conversation takes place. So far as the operation of the system is concerned, the procedure is no different from what it would be if wire connections were provided throughout.

English operator directing traffic at big race meet by wireless

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One Radio Language

CONSIDERABLE comment has been heard recently about the advisability, or rather, the necessity of formulating a world-wide radio language, as intelligible to the Japs and Germans as to the English and French.

The world is rapidly being linked together by radio and space no longer is a factor in the speed with which messages flash from one people to another. Those in Alaska can converse via the wireless telegraph to the White House in Washington. Washington can get Nauen, Germany, on the air quite as easily as it can get Chicago.

Trained minds in European cities are considering the question of developing a universal language that will adapt itself to code work. Diplomats feel certain, according to reports, that such an undertaking, successfully accomplished, will do much to pacify the many different kinds of peoples on the Continent, in Asia, and in the Far East.

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Venezuela Hears Pittsburgh

AN idea of the vast distance over which radio concerts may be detected and the number of people who are benefited by the entertainments which fill the air nightly is indicated in a letter recently received by the KDKA broadcastng station of the Westinghouse Electric and Manufacturing Company, at Pittsburgh. The letter is from Arthur H. Williams, who is employed in the American Consulate, La Guaira, Venezuela.

Mr. Williams said that while listening in at a Venezuelan government station "AYG" which is situated at Maiguetia, a suburb of La Guaira, he is able to hear broadcasting from Pittsburgh. With a loud-speaker attachment it comes in loud enough to fill a large room with music.

The station at Maiguetia is about 1,850 miles from Pittsburgh, but concerts are picked up there without difficulty. The station is equipped with a vacuum tube receiver and a two-stage amplifier.

RADIO Broadcasting soon is to be introduced into Asia Minor. The man who will be responsible for carrying the latest American development into the Near East tells of his thirty-one years of experience over there. He is

Dr. Alexander MacLaughlan

President of International College at Smyrna

DR. Alexander MacLaughlan is far too unassuming to even suggest that he will be the man to introduce radio broadcasting, as we know it here in America, to the Near East, but the fact remains just the same that without question such will be the case.

For thirty-one years this most unusual man has been closely identified with the educational and spiritual progress in the Near East. Born on a farm near Toronto, Canada, he is the product of the Queens (Canadian) University, and the Union (American) Theological Seminary. It was shortly after being graduated from the latter that he received the call to Turkey, and ever since 1891 when the institution of which he now is president was established, has he been identified with the International College at Smyrna.

The International College is an American institution. It is one of the important factors helping to break down the bitter prejudice that exists largely between the many peoples of that part of the world.

"The American institutions," says Dr. MacLaughlan, "and I myself, are not 'pro' any particular group. We are 'pro' every group, and for that reason we are able to accomplish considerable. We have been literally setting the pace. So that it is only natural, I suppose, that we will want to introduce the newest and one of the most wonderful arms of science—the radio telephone.

"NOT one in a thousand has ever heard of the radiophone over in Asia Minor," says Dr. MacLaughlan.

"We will prove to them it is an accomplished fact, and we hope that it will be one more link in the chain that will weld the many peoples together into a bond of common fellowship."

Dr. MacLaughlan left New York early in May for England, his first stop on his way back to Turkey.

"In our institution there are perhaps twelve to fifteen races represented. There are nearly as many different ones on our faculty. These include Turks, Greeks, Armenians, Jews, and many others.

"Each group has been taught at home to be distrustful of the others. But they all come to the College and there the sons of Turkey play handball and football with those of Greece, and there discover that instead of being someone to dislike, their neighbors are good fellows, likable fellows. That is helping to break down the barriers that used to exist.

"There is no more wonderful way to help break down these prejudices, to bind the human race into a common fellowship, than the radiophone. Think of its growth! Two years ago I was in this country last. Then, to the public, it was an unknown thing. And now it is here, a reality.

"Not one in a thousand has ever heard of the radiophone over in Asia Minor. They will scoff at the idea of being able to transmit the voice for many miles. But we will equip ourselves, if it is at all possible, with a low-powered transmitting station and several receiving sets, and we will show them it is an accomplished fact. It will do much to weld together the many peoples over there, I feel sure. We will be able, possibly to broadcast the religious services. Perhaps we can form a three-cornered broadcasting arrangement between Smyrna, Constantinople and Athens.

"I can recall when we set up, some fifteen years ago, a wireless set within the college. In one room we put the sending apparatus, and in another the receiving set. We made a small bell ring, and hundreds came to marvel, many insisting we had wires strung between the two points.

"Of course, we have wireless in general use over there. The German government built a large station nearby during the war, and it was used for military and political purposes. But general use of the radiophone to broadcast music and other things is unheard of as yet, and it will be up to our American institutions to pave the way."

Dr. MacLaughlan believes that not only will radio materially assist in bringing about a better understanding in the Near East, but that everywhere throughout the world will it have that effect. The political situation in the Near East is highly complex, he adds, but with radio an accomplished fact, there is no such thing as being alien; the people hundreds of miles away are nearby neighbors, and this will have, he believes, an astonishing reaction in the relations and affairs of the world. It will bring the people closer together.

Constantinople, where broadcasting may be introduced

Radio at North Pole

SECRETS of the North Pole are to be unlocked by the airplane, the camera and the wireless telephone.

"Modern instruments of science," says Captain Ronald Amundsen, "will give to the farmer, the manufacturer and the seafarer information of incalculable value of the Far North's mysterious effect upon conditions here."

He is preparing a four years' expedition to the North Pole. Amundsen is the discoverer of the South Pole.

"By ship I shall float with the ice fields over the roof of the world," he said. "Airplanes will take us over the North Pole. With movie cameras we will get a photographic record that will never perish. And by radio I shall be in daily touch, if necessary, with civilization, relaying reports that otherwise would be hidden for years."

Amundsen says science has made easy the path of the explorer.

"From the ship we can sail by airplane over a radius of 100 miles," he says, "observations of upper air conditions and photographic maps will be easily made. Our radio will keep us in constant touch with the world.

"The best of it is that our information will not be stale when we send it back. Our radio will take care of that.

"Our daily radio reports on the weather, the water, the air and the ice of the North Pole may have distinct value to the people of the United States and Europe.

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Concert in Prison

RADIO has penetrated prison walls. Inmates of the Detroit House of Correction have listened to a radio concert. The House of Correction set is installed so that it can be operated either in the chapel which seats 300 inmates, or in the cell blocks.

The first number on The Detroit News program, to which the inmates listened, was the Lenten sermon by the Rev. W. E. Bowyer, pastor of the Warren Avenue Baptist Church. The clergyman was given appreciative hearing, as was the Rev. Gaius Glenn Atkins, who spoke on the Woodrow Wilson Foundation. The inmates enjoyed the vocal solos by Miss Emily Frawley and Lou Kennedy, and the saxophone solo by Joe Benke.

Broadcasting Stations

KYW—360 meters. Daily, 8 P.M. Central time, 9 P.M. eastern time. Westinghouse Station located at Chicago, Ill.

KDKA—360 meters. Daily, 8 to 10 P.M. Westinghouse Station located at East Pittsburgh.

WBZ—360 meters. Sundays, Mondays, Wednesdays and Fridays, 8 P.M. Westinghouse Station located at Springfield, Mass.

WGI—360 meters. Evenings. American Radio and Research Corporation station located at Medford Hillside, Mass.

WGY—360 meters. No schedule. General Electric Co. station located at Schenectady, N. Y.

WJZ—360 meters. Daily, 11 A.M. to 10 P.M. Radio Corporation-Westinghouse Station located at Newark, N. J.

WVP—1450 meters. Evenings, 9 to 9.55 o'clock, except Sundays and Holidays. Signal Corps, Bedloe's Island, New York Harbor.

Stations Broadcasting Music and Speech on 360 Meters

AGI	Signal Corps, Presidio	San Francisco, Calif.
DDV	Noble Electric Works	Monterey, Calif.
IDJ	Raymond F. Farhams	Pawtucket, R. I.
KAQ *	Young Men's Christian Association	Denver, Colo.
KDN	Leo J. Meyberg Co.	San Francisco, Calif.
KFC	Northern Radio & Electric Co.	Seattle, Wash.
KFI	E. C. Anthony	Los Angeles, Calif.
KFU	The Precision Shop	Gridley, Calif.
KFV	Foster Bradbury Radio Store	Yakima, Wash.
KFZ	Doerr Mitchell Elec. Co.	Spokane, Wash.
KGB	Wm. A. Mullins Electric Co.	Tacoma, Wash.
KGC	Electric Lighting & Supply Co.	Hollywood, Calif.
KGF	Pomona Fixture & Wiring Co.	Pomona, Calif.
KGN	Northwestern Radio Mfg. Co.	Portland, Ore.
KGO	Altadena Radio Laboratory	Altadena, Calif.
KGU	M. A. Mulrony	Honolulu, Hawaii
KGW	Oregonian Publishing Co.	Portland, Ore.
KGY	St. Martins College	Lacey, Wash.
KHD	Aldrich Marble & Granite Co.	Colorado Spa., Colo.
KHJ	C. R. Kierulff & Co.	Los Angeles, Calif.
KHQ	Louis Wasmer	Seattle, Wash.
KJC	Standard Radio Co.	Los Angeles, Calif.
KJJ	The Radio Shop	Sunnyvale, Calif.
KJR	C. O. Gould	Stockton, Calif.
KJR	Vincent L. Kraft	Seattle, Wash.
KLS	Bible Inst. of Los Angeles, Inc.	Los Angeles, Calif.
KLB	J. J. Dunn & Co.	Pasadena, Calif.
KLN	Noggle Electric Works	Monterey, Calif.
KLP	Colin B. Kennedy Co.	Los Altos, Calif.
KLS	Warner Bros.	Oakland, Calif.
KLZ	Reynolds Radio Co.	Denver, Colo.
KMC	Lindsay-Weatherill & Co.	Beedley, Calif.
KMJ	San Joaquin Light & Power Co.	Fresno, Calif.
KNO	Love Electric Co.	Tacoma, Wash.
KNJ	Roswell Public Service Co.	Roswell, N. Mex.
KNN	Beacon Light Co.	Los Angeles, Calif.
KNV	Radio Supply Co.	Los Angeles, Calif.
KOB	New Mexico College of Agriculture and Mechanical Arts	State College, N. M.
KOE	Spokane Chronicle	Spokane, Wash.
KOG	Western Radio Electric Co.	Los Angeles, Calif.
KON	Holzwasser (Inc.)	San Diego, Calif.
KOP	Detroit Police Department	Detroit, Mich.
KOQ	Modesto Evening News	Modesto, Calif.
KQL	Arno A. Kluge	Los Angeles, Calif.
KQP	Blue Diamond Electric Co.	Hood River, Ore.
KQT	Electric Power & Appliance Co.	Yakima, Wash.
KQV	Doubleday-Hill Electric Co.	Pittsburgh, Pa.
KQW	Charles D. Herrold	San Jose, Calif.
KUO	The Examiner Printing Co.	San Francisco, Calif.
KVQ	J. C. Hobrecht	Sacramento, Calif.
KWG	Portable Wireless Telephone Co.	Stockton, Calif.
KYY	The Radio Telephone Shop.	San Francisco, Calif.
KYJ	Leo J. Meyberg Co.	Los Angeles, Calif.
KZM	Preston D. Allen	Oakland, Calif.
KZY	Atlantic-Pacific Radio Supplies Co.	Oakland, Calif.
WBU	City of Chicago	Chicago, Ill.
WCJ	A. C. Gilbert Co.	New Haven, Conn.
WDM	Church of the Covenant	Washington, D. C.
WDT	Ship Owners Radio Service	New York, N. Y.
WDW	Radio Const. & Elec. Co.	Washington, D. C.
WFO	The Rike Kumler Co.	Dayton, O.*
WGH	Montgomery Light & Water Power Co.	Montgomery, Ala.*
WGL	Thomas F. J. Howlett	Philadelphia, Pa.
WHA	University of Wisconsin	Madison, Wis.*
WHK	Warren R. Cox	Cleveland, O.
WHQ	Rochester Times Union	Rochester, N. Y.*
WHU	William B. Duck Co.	Toledo, O.
WHW	Stuart W. Seeley	East Lansing, Mich.*
WJH	White & Boyer	Washington, D. C.
WJK	Service Radio Equipment Co.	Toledo, O.
WJX	DeForest Radio Tel. & Tel. Co.	New York, N. Y.
WLB	University of Minnesota	Minneapolis, Minn.*
WLK	Hamilton Mfg. Co.	Indianapolis, Ind.
WLW	Crosley Mfg. Co.	Cincinnati, O.
WMH	Precision Equipment Co.	Cincinnati, O.*
WOC	Karlowa Radio Co.	Rock Island, Ill.*
WOH	Hatfield Electric Co.	Indianapolis, Ind.
WOQ	Western Radio Co.	Kansas City, Mo.*
WOK	The Pine Bluff Co.	Pine Bluff, Ark.
WOU	Metropolitan Utilities District	Omaha, Neb.*
WOR	L. Bamberger & Co.	Newark, N. J.
WOS	Missouri State Marketing Bureau.	Jefferson City, Mo.*
WOZ	Palladium Printing Co.	Richmond, Ind.*
WRK	Doron Brothers Electric Co.	Hamilton, O.
WRL	Union College	Schenectady, N. Y.
WPB	Newspaper Printing Co.	Pittsburgh, Pa.
WSZ	Marshall-Gerken Co.	Toledo, O.*
WWJ	The Detroit News	Detroit, Mich.*

* Stations broadcasting market and weather reports on 485 meters in addition to music on 360 meters.

Newspapers Want Re-Allocation

THE importance of newspaper broadcasting was recognized by the radio conference when Dr. S. W. Stratton, chairman, favored reallocation of the wavelength band in which newspapers operate.

This was also favored by Chief Radio Inspector W. D. Terrell of the Department of Commerce.

Newspapers at present are classed with owners of private stations, stores and communication companies. In the various cities they are obliged to operate within small sections of the allocation between 310 and 435 meters.

It was represented to the conference that because of the extensively public nature of newspaper broadcasting, newspapers should not be classed under the private designation. It was pointed out that universities, whose broadcasting is of a limited range as compared with newspapers, are classed with State and Government stations as public broadcasters.

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At the 18th Hole

MEMBERS of the Dixmoor Golf Club, of Chicago, will now satisfy both their desire to play their favorite game on Sunday and at the same time look after their spiritual welfare. A radiophone has been installed in the club house, at the suggestion of the local pastors, who claim that their congregations prefer golf to church. O. C. Upham, president of the club, solved the problem by saying that as the golfers could not be brought to the church, the church will be brought to the golfers, via radiophone. A contribution plate will be placed at the 18th hole.

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Tune In for the 3-Alarm!

LIFE around the firehouse between fires is more interesting these days. Radio did it.

Radiophones have begun to interest firemen throughout the country. Concerts, lectures and messages from ships at sea have been received by firemen, who have rigged up wireless telephone apparatus at the stations.

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"All Modern Improvements"

CERTAIN real estate dealers in Philadelphia are equipping houses with complete radio receiving sets. The sales of suburban homes have been increased by this innovation.

"I could visualize my audience separated into thousands of tiny theaters—the millionaire, the lumberjack, the backwoodsman—all listening to the same song. What an audience!"

Those were the thoughts that flashed on the occasion of her first broadcasting, to

Olga Steck

and she describes them vividly in the following interview

With Maurice Henle

There is nothing theatrical about Olga Steck's appearance.

NOT only is Olga Steck one of the radiophone broadcast pioneer artists, but she is the prima donna in the first American musical comedy production having a "radiophone number."

That gives her broadcasting impressions double interest, to radio fans as well as theatergoers. In introducing her by picture and printed word to the thousands of listeners who have heard her voice in the air, let it be said that she is a very charming, pretty and winsome little lady with a speaking voice as clear as her rich soprano notes, and a personality that vitalizes every thought expressed.

Conversationally, she told me that it was not long ago, less than a year in fact, that she reached Broadway from sunny California. Out there she was a great favorite in musical plays. But it seems that a theatrical light is only a glimmer until it has shined on the Gay White Way. And so Miss Steck reached the Big Town for greater triumphs.

Then, one evening, after she had been in New York for a few months, her former musical director who, along with a sizeable section of the public, had been dazzled by the star's eyes and voice, telephoned her and extended an invitation to sing over WDY, the Roselle Park station.

She accepted right there and then, with a mental murmur that the inventor of the phrase that "there is nothing new under the sun," didn't know what he was talking about.

Here was an experience!

But let Miss Steck tell you:

"There were only a few of us in the broadcasting studio. I had selected several numbers to sing. The announcer spoke into what looked like a regular telephone, motioned me toward the singer's stand, and then the piano accompanist began to play.

"No One In Sight"

"I want to confess I felt rather foolish at first singing into that queer little megaphone thing. No one to sing to. Not a soul in sight, not a sound to indicate an audience was present, and only the few members of our party to 'humanize' the performance.

"Should you suddenly stumble onto someone singing fervently to a tree, or a brick wall, or possibly a tree stump, you would laugh. I know I would. Not the idea of singing. But the thought of his singing to empty space.

"I felt in pretty much the same position. I could not tell who was listening; I was not even certain that anyone was. But somehow or other I convinced myself that the gods were not playing a practical joke on me and I finished the evening."

She threw back her pretty head and laughed merrily at the recollection. And then she immediately became serious again.

"But the next few days brought many hundreds of letters from those who had heard, those who were somewhere out in the black night listening, those who expressed their appreciation with far more vigor than ever comes back over the footlights in applause.

"It was a big moment in my life, and I thought about it seriously. And every time since then, when I have broadcasted, I remember that I have an audience, an audience, at home and in homes, separated into hundreds of thousands of tiny, so to speak, theaters, each holding a small, select audience.

"I know that I am being heard in a luxurious Park avenue home. I know that my voice is being listened to in stuffy rooms of crowded tenement houses. I see a vision of listeners in hamlets, along the highways and by-ways of sleepy country lanes. And I see the rough lumber-jack, the weary coal miner and the backwoodsman — all listening to the same song.

"What an audience! Anyone would be thrilled!"

And her whimsical, delicately molded eyes half closed as if she were seeing the picture she had sketched so vividly.

"Miss Steck!"

Action! She was called from her vision by an insistent stage director, who, on the nearby stage, was rehearsing Bide Dudley's new musical comedy, "Sue Dear," the vehicle in which she holds the titular role.

It is this play that has the radiophone sing, which Miss Steck's rich soprano voice delivers with great success. The play, written by Bide Dudley, well-known newspaperman, and C. S. Montanye, with music by Frank H. Grey, opened several weeks ago in Stamford, Conn. From there it went to Atlantic City before heading for New York City and Broadway.

Public To See Her

"Say It By Radiophone" is the name of the number. A large amplifier has been placed in the audience. The dainty Olga sings the song, assisted by Albert Derbil and the Ritz Male Quartet. Then she goes off stage, and the audience hears the chorus sung again by Miss Steck, but this time she is in her dressing room.

And even then her personality fills the auditorium, just as it projects itself through the ether and over the radiophone. And I was glad that the public, the immense broadcasting audience, will have the opportunity of actually seeing her in "Sue Dear," which makes first use of the radiophone idea on the American stage—just as I have inadequately pictured her here.

"Cheer Up! Never mind your troubles. Remember the greatest thing in life is leisure, leisure won by hard work. Music by radio can help us to escape the monotony of daily toil, develop the mind and bring happiness into our lives"

Excerpts from an address broadcasted from WJZ

John C. Freund

Maintains that radio will be a potent force in bringing music home to the masses

John C Freund
Editor
Musical America

WHAT'S the great world cry today? It is "We want a better life!" That cry comes from the harassed so-called captain of industry bowed under his burdens as it comes from the harassed wage-earner trying to make both ends meet with falling wages and the rising cost of living.

What are you all getting out of life anyway? — Life! — God's greatest gift to man!

You go from home to office or store or factory on foot, by car, by subway, or elevated, over a ferry perhaps; in the middle of the day you take a little time off to swallow a meal which may be a good one or may only consist of a sandwich or some ice cream, and if you are female, you lighten it up with a powder puff and a lipstick. Then back to work and home again by car, by subway, or elevated, over a ferry and by the time you are home, most of you haven't the pep left to enjoy the leisure that you have won and so many of you instead of indulging in some rational social life or going to hear some good music or a good play, off you go to the movies, a vaudeville show or a cabaret where you shimmy and fox-trot to the music of the jazz, preferably with somebody else's girl or wife.

You haven't yet been educated to realize that the end and aim of life should not be work, work all the time but leisure, leisure to spend a little time with your family, if you are married, to get acquainted with your own children instead of telling mother to put the kids to sleep as you smoke a pipe, read the latest murders and suicides in the evening papers and so to bed to prepare for the next day's monotonous toil, for monotonous it is for nearly all of us — same faces, same stunt, same roll-top desk, same job at the factory, same stenographer to look at, pretty or otherwise, as you dictate if you are a business man your ever-increasing monotonous replies to the correspondence you receive which generally begins: Dear Sir: Yours of the tenth duly to hand, etcetra, etcetra —and so it goes.

The great facilities of travel and living, the great inventions are making all our lives more and more monotonous. Do you realize that?

Formerly a shoemaker made a shoe, the whole shoe. If he was in a small town, he was the center of the scandal and the news. He knew your corns and your bunions and your troubles.

Today, through labor-saving machinery, a man or a woman stands or sits at a machine and does one little job eight hours a day, six days a week, fifty-two weeks in the year. Soul benumbing labor. Do you realize how awful that is?

It is to escape this monotony that men try to smoke themselves to death while playing penny ante while the women murder one another's reputations at sewing circles or mothers' meetings, while the young people get out into the streets and pair off like the birds, go ice-creaming and tangoing as if that was the best way to prepare them for life or their work.

Wherever you go, you find human energy expended just after the day's work is done in an endless number of ways that are positively infernal because of their stupidity. Of all the things that can help make life unreal, it is the movies which must have the happy end where after several acts of villainy, all is well when someone taps the villain on the back and tells him to be a good boy in the future.

Music can help you!

Hitherto good music has been looked upon as something just for the educated few who go to hear the symphonies, the opera, the great artists.

Music belongs to all!

It begins where words end — it whispers to us of immortality.

And it came out of the mass soul in the shape of the folks songs, the songs of the people.

It didn't start as an art.

That's why some of us are trying to give it back to the people, to democratize it.

Some believe that classical music is the only good music.

Rats!

Good music may be a lovely waltz by a great composer or a homely ballad or a quartet or a chorus, though a chorus must not be a drinking song, for, like some of the rivers, we have gone dry, that is those of us who are so by conviction or under doctor's orders.

The main thing with music is to have it in the home, not alone in the church or in the concert halls but in the home whether it comes in the shape of a talking machine, a player-piano or a radio set.

Let me tell you mothers and fathers, that with music in the home, the boy will bring in a better type of girl and the girl will certainly bring in a better type of boy. To you girls, let me say that if you have any fellow who threatens to be a "steady" and who can't stand a little good music, take an old man's advice and — fire him.

Did you know that a multi-millionaire one day passing along the street heard the sound of violin playing. Curiosity brought him into the place and he found a little, fat, freckled boy scraping away. He became interested in the boy, gave him a chance. That boy later became a multi-millionaire himself and one of the great characters of these United States. The name of the man was Andrew Carnegie and the fat, freckled boy is Charles M. Schwab, head of the Bethlehem Steel Works, where at times they have from fifteen to twenty thousand employees. It was his music which gave him a chance.

Let us not forget the radio which already has millions of auditors and will be a most potent force to bring music home to the masses.

Baldwin, the Phone Maker

NATHANIEL BALDWIN of Utah is the man from whom the Baldwin receivers get their name. His product has become so widely known that a few words about its origin and a word picture about the inventor himself will not be amiss.

Baldwin radio products are manufactured in Salt Lake City. They have been manufactured there for the past eight years. Mr. Baldwin, native of Utah, has been working steadily and his reward is coming in now, for his telephone receivers are becoming famous and the clamor for them is far beyond the capacity of his small factory. But the inventor and manufacturer is not excited or enthusiastic over this rush of orders.

"I don't know why there should be any story written about our work out here," Mr. Baldwin good humoredly told a newspaperman recently.

It is not easy to find the Baldwin Radio factory. It is not in the factory district of Salt Lake or even in the city proper. Even the street is not paved. There is no high smokestack to mark the site. Near the road there is a modest little cottage, the home of the owner of the plant. Across the street is a long one-story frame building, built on the order of temporary quarters put up by construction companies. Beyond it are several other similar buildings. These are parts of the factory. Sheet iron or tin pipes protrude a few feet higher than the low roofs; these are outlets from small stoves that furnish heat.

But the interiors of these buildings are busy places. Last September there were less than forty men employed by Mr. Baldwin. The popularity of his wireless telephone receivers was just then beginning to spread. He built additions to his frame factory buildings, the different stages being plainly visible by the stage of discoloration from weather on the rough pine boards. No paint has been wasted on the exterior of these buildings.

The farmers who applied for work were given it, until now there are 110 men employed, and only space limitations prevent the employment of more. The orders are far beyond the capacity of the plant.

Mr. Baldwin is a native of Fillmore. He went to school in Provo and attended the Brigham Young University and later taught there. Then he became interested in electricity and invented his telephone receiver. He has made other inventions and the factory does other work besides making these receivers, but it is the wireless telephone receiver that is making him famous. He has different types for different lines of work, and the receiver will work also with wire telephones.

Mr. Baldwin is said to be democratic in some of his ideas. It is reported that he drives a low-priced car because that is all that the men working for him can afford and he does not want to be conspicuous. He has not gone out into the world for his mechanics, but has taken in the farmer boys of the neighborhood and trained them in his own way and to his own efficiency.

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Ford Gets License

HENRY FORD may yet tell "flivver" owners of the intricate methods of "flivver" operation by wireless phone. The Department of Commerce has announced that Ford has been granted permission to operate a broadcasting wireless phone at Dearborn, Mich. His call is WWI.

Henry Ford (seated) listening in at Atlanta (Ga.) newspaper office

New York Police Plans

PLANS to equip the patrol automobiles of the New York City Police Department with radiophone apparatus is announced as part of a war on bandits.

Negotiations for the wireless equipment, it is understood, have been conducted by Michael R. Brennan, superintendent of telegraph of the police department. Provision is being made for a broadcasting station that will keep in touch with all police automobiles at all times of the day and night, whether traveling at high speed or standing still.

It is proposed to make use of a wave length that will permit of no interference by amateurs or high-power broadcasting stations. In each automobile one policeman will have receivers constantly to his ears and will be able to talk to headquarters.

To prevent the possibility of crooks listening in, the police broadcasting will be done largely in code.

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Concerts for Doctor's Patients

RADIOPHONE concerts for patients while waiting in the physician's office is the most up-to-date use found for the radiophone. Dr. Paine FitzGerald of Boston is the physician who has long been a radio "bug," and now entertains his sick patients with music and lectures while waiting to see him in his office.

Dr. FitzGerald says it is wonderful the way the scheme works. A patient comes into the doctor's office and is first ushered into a lounging room, in one corner of which is a big graphophone and opposite is the radiophone receiving set.

The patient is naturally feeling blue and sick at heart as well as body. Either the doctor or Mrs. FitzGerald takes a seat at the radiophone and plugging in starts tuning up to catch Medford, Pittsburgh or Newark. The patient's mind is immediately taken up with the wonder of the new invention, which is explained to him while pop-eyed he hears songs sung thousands of miles away.

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Aiding the Farmer

THE importance of radio to the farmer is becoming more apparent every day. It is asserted that the radio not only makes the isolation of the farm a thing of the past but brings quickly to the farmer the agricultural information needed in the intelligent operation of the farm.

W. A. Wheeler, delegate to the radio conference in Washington, says: "There are more than 32,000,000 people on farms, comprising nearly one-third of the total population of the United States, most of whom are located where they are practically cut off from immediate contact with the outside world. The radio is the only means of getting to them quickly, at small cost, the economic information necessary in the proper conduct of their business."

The time element in dispatching weather, crop and market news is a big factor affecting the value of such reports.

The Sunday Sermon

OUT in Jamesburg, N. J., which is just a tiny dot on the map, lives the family of Mrs. George A. Shultz. She did not get to church on Sunday morning as often as she would have liked, she told friends. Something always interfered. And then alone came the radiophone, and the broadcasting of a Sunday service.

"The Sunday service will be a wonderful blessing," Mrs. Shultz says. "My whole family listen in and enjoy it as much as if it were in the church itself."

And Mrs. Shultz's enthusiastic words lead to a bigger thing. Will the minister of the future deliver his sermon over the ether? He is doing it today, but not universally. Will he recognize that he will reach an audience of hundreds of thousands via the radiophone? Indications are that he will, for as yet no sign has come from the clergy that it is displeased with this new means of spreading happiness and education.

In fact, the opposite seems to be the truth. Ministers everywhere are interested, and while many have not tried the new delivery as yet, they show unmistakable signs of doing so in the near future.

It probably will boil down to the broadcasting of one service each week for each of the various religions. There is no question but that the influence will be one of good, for thousands who now do not attend church, who have not attended for a long time, will have their interest re-awakened.

The leader of one New York's most famous orchestras, a distinguished looking gentleman, whose name cannot be mentioned for obvious reasons, is a radio fan, and a rabid one at that.

"What one thing pleases you most of all with radio?" he was asked. His musical criticism was eagerly awaited.

He shifted his black cigar from one corner of his mouth to the other.

"Well," said he, "I guess the most appealing thing about it is that I can attend divine services and still smoke my cigar."

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A Word About the Shut-Ins

TO amuse the old folks, to interest the growing youth, to heal the sick, to instruct and inform everyone —these are the purposes of radio. This is brought out every day by the latest of those caught in radio's glamour.

The part that it will play in healing the sick cannot be over-estimated, according to Dr. C. O. Probst, of Columbus, Ohio, who says that more than 1,500 tuberculosis patients in the vicinity would be materially aided by the installation of radio sets, and that he is working toward that goal.

"The fact that patients have nothing to do, nothing to think about," he says, "and have little intercourse with the outside world, is detrimental to their recovery.

"Radio concerts and news by this latest means of communication would go a long way toward making the load of a tuberculosis sufferer lighter. By putting these sufferers ,especially the bed-ridden ones, in touch with the outside world, radio will have accomplished a real purpose."

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The Younger Generation

SPEAKERS also point out that the "street corner boy" is becoming a thing of the past. They point out that the youth of today has too much to occupy his mind and not the least of these is radio. They refer often to that old wheeze about the man who was talking to a companion. Both were substantial, wealthy citizens of their community.

"Say, Jim," said one, "What do you know about this radio thing?"

"Not a thing, George," the other replied, "but my nine-year-old boy can tell you all about it if you want to know."

This boy question is indirectly reflected in the press comment of the country every day. Says one writer concerning radio:

Get on the radio band wagon. Everybody's listening in the world around, and you must keep up with the procession.

Radio is a hobby that is worth while.

Here are a few of the things it will do for you:

1. It will make your home up-to-date with radio concerts, dances, sermons, news, market reports, lectures, addresses.

2. You will use your spare time in a way that will do you good and teach you something worth while.

3. Radio leads you by easy stages to a vocation with plenty of thrills and fat pay envelopes.

4. Radio prepares you for service in the army, navy and marine corps, aero squadron, merchant marine, commercial station, railroad system, fire department, police department, summer camp, hotel, stock exchange and government systems.

The government is right behind the boy who takes up radio seriously. The United States signal corps, United States army, is ready to teach it to the earnest boy.

Boys who reach a certain prescribed standard are eligible for invitations to attend an army camp for two weeks in the summer, free of charge.

The navy does not forget the radio boy either. For three years they have had a system for them and thousands are registered with the Radio Amateur Bureau of the Third Naval District, New York city.

From time to time other opportunities for radio boys in connection with the government will develop.

Now, how you can start?

1. Decide whether to buy or build your receiver. It will cost time, but less money if you build it. But you will probably have a better receiver if you buy it.

2. Start working out your plan and stick to it.

3. Send to the superintendent of documents, government printing office, Washington, D. C., for the following pamphlets:

(a) Document No. 1055, Elementary Electricity, 10 cents.

(b) Document No. 1064, Elementary Principles of Radio Telegraphy and Telephony, 15 cents.

These two pamphlets will let you know what is going on inside your apparatus and that will make you a better operator. The government has secured experts to write these pamphlets and you could have no better guide.

(c) Radio laws of the United States and International Convention, 15 cents.

This contains the international Morse code, which is used in most radio transmission, and the list of "Q" signals or radio abbreviations used by all operators.

4. When you get discouraged, which will be often at the start, rest half an hour and try again.

Remember, radio is the one big modern science that a boy can use as well as a man. At least 250,000 boys are working at radio right in their own homes in the United States of America.

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Appeal for Help By Radio

RADIO brought relief to the stricken city of Beardstown, Ill., which was caught when the Illinois River recently reared over its banks and rushed over occupied land. To cap the climax a levee was reported to have broken and all parts of the city caught by the flood waters.

A relief committee immediately dispatched telegrams to all parts of the country asking for relief. To supplement this, an appeal was broadcasted from various points of the country, and it is estimated several million people were informed of the city's distress by this method. Local radio stations throughout the country were asked, in the broadcasted appeal, to copy the message and to inform their home town newspapers. And so, no part of the country, however remote, was uninformed of the suffering in Beardstown.

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Interplanetary Radio Far Distant

POSSIBILITY of interplanetary radio communication is distant, says Professor J. A. Fleming, of the University of London. An electrified dust screen thrown off by the sun keeps the radio waves down to earth, while lack of such a screen around the moon makes that satellite unfit for long distance radio communication.

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Radio Movies?

TRANSMISSION of motion pictures by radio to the homes of the present generation is predicted by E. L. Eastman, director of the KYW radio station.

"We have sent pictures by wire already," he said, "and anything that can be sent by wire can be sent by radio."

Billy Jones Says:

People Want What They Want When They Want It. And Most of the Time That Is Popular, Light Songs That Leave Them Whistling And Happy

Popular and jovial phonograph artist, in an interview with Edwin Hall, explains his creed of laughter, and therein lies the explanation as to why Billy has become one of the most widely known singers of popular comedy songs

I KNEW Billy Jones, the popular comedy singer, when he was a kid up in Brewster, N. Y. That was before the Flood—of Radiophone popularity.

Much water has flowed under the Brooklyn Bridge since then, tons of toasted corn flakes have been devoured for breakfast, a World War has been fought, W.J.B. has stopped running for President, and little Billy Jones has developed into one of those amazingly rare tenors who actually are so busy they hardly have time to give interviews. But I had heard him on the air several evenings, singing at WJZ, and told him he must talk for publication, so readers of THE WIRELESS AGE might know him better.

Billy is busy because he sings for twelve — get this — twelve phonograph recording companies. He confided this over a cup of coffee and between sips explained that he takes a jaunt around a vaudeville circuit or two just to keep the good habit. In his spare time, he dashes off a new song, grabs a sandwich, and — occasionally — a little sleep.

That was Billy's daily and rather appealing routine of affairs when the big radio zeppelin began to bombard this country with its WJZ's, its KDKA's, and its WGI's. Of course, Bill's services were immediately desired, and just as he eagerly took up Uncle Sam's cause during the late unpleasantries, just so did he respond to the broadcast call.

LOVES COMEDY AND HUMOR

He put it over with a bang, and those who read these lines will recall the evenings of enjoyment he has contributed. It is only natural that, loving comedy and humor, he should get a large amount of fun out of his broadcasting and receiving experience . . . of course, like everyone else, he has installed a receiver in his home.

The sensations in singing into the broadcast transmitter are no different than those one gets in singing for the music records. In neither instance has one a visible audience. So in that respect he had nothing new to get used

A characteristic Billy Jones Smile

to, and it handed him a laugh, he says, to watch how nervous some of the artists became while singing into the little horn-like transmitter.

"THEY WANT TO LAUGH"

"The trouble with most of them," he said earnestly, "is that they all want to sing grand opera. Get away from it! The people want something light; they want to laugh."

Billy received a letter from someone who had listened in out in Pennsylvania, a letter which was the outcome of an argument the writer had with his wife. The wife wanted to wager the next day's breakfast, or something, that Billy's singing partner that night, Ernest Hare, was tall and slim, fully six feet, whereas Billy himself was very short and plump. And he was willing to wager — for the retention of the said breakfast— that the opposite was true.

"For goodness sake," the man wrote, "send a picture of you two, and let me win one argument from my wife."

Billy assured him both Mr. Hare and himself were neither very tall nor very short, and that therefore neither won.

Incidently it might be mentioned that Jones answers every radio letter he receives, and he is seriously considering hiring a social secretary, so heavy has the mail become.

At the beginning of this sketch I mentioned that Billy came from Brewster, N. Y. The folks up there always knew that the little choir singer with the unusual voice would get some place, and they were satisfied their predictions were good ones when they listened in and heard his voice over the radiophone.

Billy likes to do his own announcing — all artists do for that matter — and when he does he injects the humorous element. He will mention by name any one of his friends he knows to be listening in. Every mail brings letters asking who is the party in Larchmont with whom he is always joking. I tried, also, to find out, but had to be satisfied with a Ha! Ha! and a He! He! So it may merely be speculated that someone has completely won the comedy tenor's heart, and has bought a radio set because Billy broadcasts.

Speaking of love, he is convinced now that Romeo, Michigan, is well named. One night he was singing one of his latest compositions, "Love Her By Radio." A couple of days later he received a response; 'twas contained within a perfumed and tinted envelope with a heavenly odor strong enough to do a hundred-yard dash in ten seconds flat. He wrote back, asking if the environment of living in Romeo was responsible. There's one town Billy's fighting shy of.

DOUBLY POPULAR NOW

And from North Carolina there was a letter saying his voice came to them clearly "mid the moonshine," and then went on to tell that the writer meant it literally, as he had the radio set rigged up just about ten yards or so from the family still, and that he took double stimulation from Billy's songs heard in his mountain home in such pleasant surroundings!

And so they run. Billy Jones was well known long before the radiophone came into common usage. But he is doubly popular now, and it is all due to his ability to stick to his field — comedy singing.

"The people want what they want when they want it," is his creed, "and most of the time they want popular, light songs that make them happy, not depressed."

When Ether Waves Run Wild

THE night was quiet, as nights usually are, unless they are noisy. And from out of the prune tree Gunga Din gently slid with his radio set tucked under his left arm, and he sang joyfully and softly in a high-pitched bass voice the latest of late hits, "Pay Me By Radio."

Gunga is a good old scout. His presence is a long-looked-for joy to every inmate of the county insane asylum and the folks who work in the pretzel bending factory just over the railroad tracks delight in having him hike out to the athletic field where they take their daily exercise to limber up and make them flexible and fit to bend pretzels.

Mrs. Din's little boy had caught the popular fever and nowhere did he go without his radio set. He read the newspapers, too, and scanned every radio item.

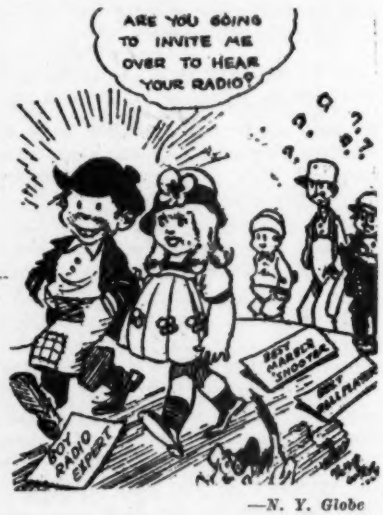
Among the items he read about the chap who believed he could hypnotize via radio especially interested him. What an opportunity! Just think how science has progressed. Why, nothing is impossible, thought he. That's Gunga, all over. For hours at a time he would sit and think. And then, of course, there were hours when he would only sit.

He cursed his luck with a "darn" and a couple of "goshes" when he read the announcement by an expert that big eared boys with red hair make the best radio operators. That forever barred him from becoming a shining light in the radio field, he cursed again and again. His ears were big all right, all right, but his hair was of the brilliant color one gets by mixing purple, orange, indigo and green. There was only one thing to do and that was to shave off his hair and then the gods who watched over the destinies of radio might be fooled.

On the night in question we find him slipping out of the prune tree. He had ben reading the thousands of prophecies and declarations made in the newspapers by earnest local reporters, who had been pulled off the job of writing obituaries and made Radio Editors. His head fairly swam and this alone brought him joy as he reflected that he had never learned to swim himself. What radio will do for one!

Why could not one get in touch with Mars or Venus or Jupiter by radio? If these other things were not impossibilities and the newspapers said they were not, why indeed could one not use the newly found wonders to plumb the depths of the unknown universe and find out all about the other planets? That was why we find Gunga near the prune tree. He had read somewhere that prune trees adapt themselves especially well to interplanetary communication, and that one needs only to wind the aerial around three and a half prunes of the 40-cent a pound size and then repeat the radio prayer "Alagazam, alagazam, oogi, oogi, blick" seven or four times to get the proper wavelength. This he did and as he slid down — for the third time — he sank upon the ground, put the receivers around his pear-shaped (beg pardon) prune-shaped head, and tuned in.

THE NEW HERO



—*N. Y. Globe*

At first he caught PDQ (Reno) and he listened impatiently to a few bars from the Pill Song from Carter, and the Powder Symphony from Colgate. He tuned again with slightly better luck and caught SOL (Zion City) and listened to a sermon on why the earth was flat. He was getting nearer to the edge, he exulted.

And then from far off there came a mass of sound, of swiftly moving jargon, which he knew positively did not have a place on this earth. At last! He, Gunga Din, had made the first inter-planetary communication! He waited eagerly until the noise subsided into a semblance of order. And then he heard a voice:

Voice: Hellohellohello.

Gunga: Whoisthis? Whoisthis? (He was excited and he let his words run together like an alley gang.)

Voice: This is Mars talking. Incidentally I might mention you are speaking to the smartest cockroach on our planet. Who are you?

Gunga: I'm Gunga Din on Earth.

Voice: Earth! At last! I thought down there you never would get hep to radio. We cockroaches of Mars have known about radio ever since the era of Kitchen Sinks.

Gunga: Cockroaches! You don't mean to tell me you are a cockroach!

Voice: I don't eh? Ask Howard Zimmerman of Harrisburg, Pa., what we cockroaches know about radio. Ask him.

Gunga: Yes, I read some place that he claimed cockroaches discovered radio or something, but tell me, do cockroaches live on Mars?

Voice: I'll say they do. All of Archite's forebears have tried in vain to get in touch with you, and we even sent some of our scout roaches to teach you how, but we wearied of your ever learning, until we caught your signal. Just a minute, I want to throw in a connection with Venus. I want to let them in on this.

There was a pause during which Gunga heard a buzzing noise and then he caught a second voice, a higher pitched one.

Voice: Say bug, this is a good one. Whom do you think I have on the radio?

Second Voice: Can't imagine.

And There's Humor in the Air

Voice: The Earth!

Second Voice: Well, I should light a summer's evening! Mercy, ho!

Voice: Gunga, are you still there —physically I mean of course. I want you to meet a great friend. Lightning bug of Venus meet Gunga Din of Earth.

Gunga: Lightning bug! Do you live on Venus. Why, we thought Venus was inhabited by men.

Second Voice: Men used to live here until they reached this more advanced stage. We, too, of Venus, despaired of your ever getting next to radio. At last you are, but I want to warn you that you owe it to the lightning bugs we sent down there. You can prove it by Hamilton Bailey, of Peoria, Ill. He knows.

Voice: Don't you believe him, Gunga, it was just as much our scout roaches as their bugs that taught radio.

Second Voice: Nonsense, Gunga, nothing doing. Don't you believe him.

Voice: I'll crawl all over your sink, you insignificent incandescent bulb.

Second Voice: Yes you will—not.

Voice: This is an insult. I shall call a meeting immediately of the Roachery, and we'll see if a war —

There was a mass of incoherent sound and the rest was lost on Gunga.

And Gunga was very thoughtful as he plucked a ripe prune. He munched it as he wended his way homeward.

Oh, very well.

The Wireless Widow

By George Mitchell

I've been a widow all my life;
That is, since I have been a wife,
Communing with myself, the time,
In solitary pantomime.

Golf claimed him almost every day,
And, as he niblicked on his way,
I followed in his gallery
Or, on the club house porch, drank tea.

At night, Bridge took him from my side;
I couldn't play it — though I tried;
But sat at home, with ill-content,
The while he gambled with the rent.

He gave up both. Said he: "I'm through,
I'll stay at home alone with you."
But Radio's got him. Fickle men!
And I'm a Widow once again.

—*Judge.*

A very wise plan
Has Dapper Dan—
His ten wives think
He's a wonderful man.

They're scattered throughout
A nation or so
But he keeps them all happy
By Radio.

Chorus: Oh, man, what a bee-u-tiful theme!

PRACTICAL USE

HAVE A SENDING OUTFIT IN YOUR HOME AND PUT THE RADIO TO REAL PRACTICAL USE

—*Savannah News*

THE radio messages some think they are getting from Mars probably at that are as authentic, as someone recently remarked, as the messages Sir Arthur Conan Doyle gets from the dead and those former Secretary Tumulty gets from the living.

THE phrase "tuning in" has only one meaning to a young father, and it is not connected with radio. Any father will tell you that the Young Ones are the greatest little tuning coils on the market and they usually commence on the yellophone just when Dad feels like anything but walking the floor.

"Our Boy Has a Wireless"

By Mary Barton Smith

Our boy has made a wireless,
I tell you I am glad,
The thing is done and all set up:
For sometimes I got mad.
He talked about it all the time,
morning, noon and night—
The dining room was upside down,
The rug was out of sight.
There was saw-dust on the table
And shavings on the floor,
I didn't get to sweep that room
For three whole days or more.
He'd plane and hammer, saw and file,
And scatter things about,
Then he'd make a break for school and—
"Don't touch things", he'd shout.
He'd prowl around and fret and hunt
For things he couldn't find.
And then he'd get a spool of wire
And wind and wind and wind,
I think he wound a thousand miles—
Of cause I can't be sure—
I know I held the spool for him
Until my arms were sore.
He mussed up kettles, pots and pans
To melt the parafine;
He even got some in the grease,
I had to cook things in.
He used up all of his dad's ink—
He took a china cup—
To mix the mixins in he used,
To stain the thing all up.
And when we put the aerial up
I froze myself 'most blue,
But I had helped him all along
And had to see it thru.
Some people passing in the street
Wondered what it could be,
Professor Budin stopped and asked:
"Is kitty up the tree?"
But now it's done and all set up
And we can hardly think.
It's—"Hush! be still! I hear it buzz!
It's Arlington I think".
Then dad, he looks at me and grins,—
You know we dassn't talk—
And then we just float out the room,
—You know we dassn't walk—
But now we're just plumb proud of him
We don't care for the muss,
We want to keep him young in heart
And always loving us.
I'll send a wireless each day
To our great God above;
"O, always keep him sweet and pure
Protect him with Thy love".

Gloversville (N.Y.) Herald

Thank Goodness!

"Contrary to the general impression there is little or no mystery about radio telegraphy or telephony—"Wireless—as it is commonly called."—*From a New Jersey newspaper.*

The Bell System In Radio

The Telephone Company's Position In Respect to Patent Agreements — Plans for Supplementary Phone Services and Public Broadcasting Facilities

By A. H. Griswold

RADIO today is a magic word throughout the country and, like anything else occupying headlines, much has been said of it, both good and bad, which it has not rightfully deserved.

What is radio? While it would probably take volumes to give a complete explanation of radio, yet perhaps it can be briefly explained in the following manner.

In the ordinary alternating current electric light and power circuit, such as are used to furnish light to homes and power to factories, the periodicity of the electrical current is almost universally sixty cycles per second. In other words, there are sixty complete reversals of the electrical current every second. At this low periodicity or frequency practically all of the electrical energy is confined to the wire system and none of it radiated into space. However, by sufficiently increasing the frequency or period of oscillation of an electrical circuit and by suitable circuit arrangements a large proportion of the electrical energy generated may be radiated into space as electro-magnetic waves. These electro-magnetic waves travel through space with the speed of light and have frequencies varying from around 15,000 to several million cycles per second.

In order to transmit a telephone message by radio the amplitude of the high frequency waves sent out is made to vary in accordance with the variation of current produced by the voice in an ordinary telephone circuit. The problem of producing these high frequency electrical waves and of thus controlling them by telephone currents has been solved in a satisfactory manner only by means of the three-electrode vacuum tube.

During our development of the vacuum tube in connection with the telephone repeater, we found that it was possible to make larger and more powerful tubes which could be used for radio telephony, and it was this development that brought about the memorable and remarkable experiments of 1915, when we talked by radio to Paris, San Francisco and Honolulu. Subsequently the laboratories of the Bell System have diligently continued their development and research work, until today the fundamentals of radio telephone communication are fairly well established, and the kind of equipment necessary is generally known, although it has not been commercially produced except for such real uses as have been found in the field of telephone communication.

At the same time development by others of radio and allied equipment was taking place and, as might be expected, it was not long before it was found that the patent situation was considerably involved and that the public would be unable to obtain the full benefits of radio unless some arrangement could be made between the holders of the patent rights which would permit of unhampered development. Accordingly, at the request of the United States Government, the General Electric Company and the American Telephone and Telegraph Company entered into a cross-license patent agreement, effective as of July 1, 1920. In general, by this agreement, the American Telephone and Telegraph Company received licenses in the field of commercial and public service radio telephony, while the General Electric Company received licenses in the field of amateur radio telephony and all radio telegraphy.

Following the execution of the principal agreement between the American Telephone and Telegraph Company and the General Electric Company an extension agreement was entered into whereby the General Electric Company may extend to the Radio Corporation of America any of the licenses which the General Electric Company received under the principal agreement, and likewise the American Telephone and Telegraph Company may extend to the Western Electric Company any of the licenses which the American Telephone and Telegraph Company received under the principal agreement. Subsequently, the Westinghouse Electric and Manufacturing Company, who also had been at work in the radio field, entered into the agreement in the same patent license fields as the General Electric Company and Radio Corporation of America.

A. H. Griswold, author of this article and Asst. Vice-President of the American Telephone and Telegraph Company

Prior to all this, the Radio Corporation of America had been formed, had taken over the interests of the Marconi Company in the United States and had entered into an agreement with the General Electric Company whereby it acquired rights to use and sell all radio equipment which the General Electric Company was licensed to manufacture.

The situation today, therefore, is as follows:

In general, radio telephone equipment for commercial or public service uses is provided by the American Telephone and Telegraph Company or through its manufacturer, the Western Electric Company. Amateur radio telephone equipment, radio telephone broadcasting receiving sets, and radio telegraph equipment are manufactured by the General Electric Company and Westinghouse Company and are sold through the Radio Corporation. The underlying principle throughout this cross-licensing agreement is to insure and make available to the public the complete development of radio.

Radio Telephony a Supplement to and Not a Substitute for Wire Service

The interest of the Bell System in radio lies in whatever application it may have to the possible future development of telephone services. In the Bell System or any other system based on sound economic principles,

the fundamental consideration in any communication problem is the provision of the type of facilities which will give the best and most economical service to meet the particular set of conditions involved. In this there is made no distinction between wires and radio, as the premise is the proper type of communication and the conclusion may be wires or radio. However, it happens that the inherent features of radio telephony are such that it has no economic or service application in the United States, or in any other place where conditions are similar, except as a supplement or auxiliary, in certain instances, to the wire service, but in no case a substitute therefor.

The real applications of radio are in communications across wide stretches of water, in ship to ship, in ship to shore, in airships to land, in possibly some other types of mobile stations, in some forms of broadcasting where the same communication is given simultaneously to a large number of people, and in remote cases where, due to geographical or other conditions, it is impossible or impracticable to place wire lines. All of these applications will be recognized as supplements to the regular wire service and not substitutes for them. For the regular telephone service both local and long distance, for which wires are now so extensively employed in the United States, the limitations of radio are such that it cannot be used.

Radio Telephony Can Never Replace Universal Wire Sebvice

The general telephone communication goal in the United States is universal service. This is merely a brief way of saying that any person, anywhere, at any time, can quickly, reliably and at a reasonable cost, talk with any other person anywhere else in the United States, and for this talk these two persons will have available facilities for their personal, private and uninterrupted use. Radio does not meet these requirements. It provides unguided transmission, sending out its message broadcast to anyone within range properly equipped to receive it, while wires, although they came first in scientific development, really represent the refinement of the art and provide guided thansmission directed only to the person for whom intended. Scientifically it is actually more remarkable that we are able to guide messages by means of wires than to send them out broadcast by radio.

The number of communications which can be transmitted simultaneously by radio is narrowly limited. Daily over 60,000,000 telephone calls take place over wires in the United States. In New York City 4,000,000 calls are handled per day and 100,000 calls per minute during the busy hours. The facilities of the ether within any reasonable practical range are so limited that but a very small fractional part of such an enormous volume of messages could be handled by radio. Further, the real applications of radio as hereinbefore outlined will undoubtedly demand greater facilities than the ether will afford and it is certainly desirable that the ether be conserved for such real and necessary uses. If this is not done, it will be almost hopeless to expect that satisfactory service can be given even in the real fields of radio.

The cost of radio equipment and operation for universal service would be enormous. The investment of the Bell System in the United States today is less than $200 per subscriber's station, including both local and long distance lines, and comprehending all the poles, wires, cable, conduit, equipment, land, buildings and accessories of the entire system. It is impossible to conceive at any cost any form of radio equipment which would provide the same universal telephone service.

However, suppose an attempt were made to set up such a radio service. It can be imagined to be along either of two lines: First, the apparatus at each subscriber's premises might be kept as simple as possible, and arranged only to connect that subscriber to a central office in a manner similar to that by which each subscriber is now connected by wire. Second, by making the subscriber's apparatus more complicated, the subscriber might be given apparatus enabling him to directly connect with other stations in his vicinity, and he would reach more distant subscribers by connecting to a central office. It is impossible to imagine any arrangement so comprehensive as to enable him to directly reach all other subscribers.

In the first case his apparatus would consist of both transmitting and receiving equipment with suitable signaling and power apparatus and with some form of antenna. It would need to be much more complete and reliable than any of the present simple forms of amateur equipment. In this case the radio equipment would merely take the place of the wire connection between the subscriber and the central office, but the cost of the radio equipment would be much greater than the total cost per subscriber of the entire existing telephone wire plant. In addition central offices and trunks, involving very expensive and elaborate radio apparatus, would be required to complete the connections.

On the second assumption, part of the central office expenditures would be avoided, but the cost of the apparatus at each subscriber's station would run into thousands of dollars, and in addition a considerable part of the central office expenditures would still be necessary.

For long distance service radio has a more favorable application than it has for local service, but again it is found here that both in first cost and subsequent cost of operation it is many times more expensive than for wire circuits and does not approach them in reliability or freedom from interference and is not secret.

Thus the cost of a complete radio plant for either local or long distance service or both is far in excess of the corresponding wire plant, and not only is the first cost of radio equipment greater than for wire equipment, but the experience to date indicates that the cost of operation of radio is greater per dollar of investment than for wire plant. This means that radio telephone service, even if it were possible, must have rates, in order to pay the costs of operation, many times greater than charged for the present wire service.

From the above it is evident that the cost of radio service would be excessive and that the character of the very limited service which could be given by radio would be so far inferior to the service now given over wires that the general public, even if they could afford to pay for it, would not tolerate it.

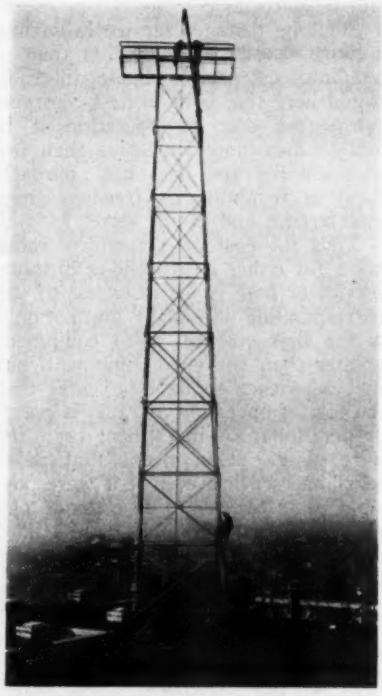
The words of the Secretary of Commerce, Mr. Hoover, at the recent Radio Conference in Washington, are interesting and to the point:

"I think it will be agreed at the outset that the use of the radio telephone for communication between single individuals as in the case of the ordinary telephone is a perfectly hopeless notion."

Some Present Applications of Radio Telephony

Let us then consider some of the applications of radio telephony which in the present state of the art can now be foreseen. Between moving vehicles, ships, ships and shore, airships and ground, and similar classes of services, radio telephony has an application. All of these are possible fields, and as time goes on, it may be expected that they will be developed into useful auxiliaries to the wire service. Recently interesting and successful experiments on ship to shore transmission were conducted with the United States Steamship *America*, operating by radio in connection with our Deal Beach radio station and thence over land wires to New York and other points. These tests showed that ship to shore service is possible, but

whether or not it is established as a commercial service must necessarily depend upon its value, which must be



As the towers neared completion in the establishment of the New York broadcasting station of the Bell system

great enough to make the service self-sustaining.

Trans-oceanic wireless telephony is, of course, possible, as was demonstrated by us in 1915. However, the present costs are very great and before it can be generally employed, the commercial value, as in the case of ship to shore, will have to be determined and assured. A factor operating seriously against such service is the great difference in time between countries located widely apart.

BROADCASTING

One of the most interesting applications of radio telephony is that of broadcasting, which is not intercommunication but a one-way service. It is in this field that radio, by virtue of its inherent nature, seems to have great possibilities. At the present time broadcasting is being done by various departments of the Government, by certain manufacturers or agents of radio apparatus, by experimenters, by newspapers, and until recently by amateurs. The existing broadcasting transmitting stations are operating in the particular interest of the owners of such stations and are not providing broadcasting transmitting service for the use of the public in general. The American Telephone and Telegraph Company controls the important patents on radio telephone broadcasting transmitting equipment for general public use and consequently is being besieged with requests to sell radio telephone broadcasting equipment or to provide radio telephone broadcasting service. We are selling the broadcasting equipment and so many of these requests have been received that it has become apparent that if every one who desires his own broadcasting equipment should purchase it, there will soon be so many broadcasting stations all operating on the same or a comparatively few number of wavelengths that real service from any of them will be impossible. Accordingly, we are now establishing in New York on the Walker-Lispenard building a broadcasting station of the latest and best type known to the art. It is not planned that we put on any program ourselves but rather provide the facilities over which others may broadcast at specified rates. We could doubtless provide and broadcast a splendid program, but by such a procedure we would be inviting the public to purchase receiving equipment in order to hear our program and we would be committed to the indefinite continuance of a service for which no revenues would be received. By providing facilities for the use of others it rests with those who broadcast to furnish a class of program to which the general public will desire to listen. It is thought that in this manner the true attitude of the public toward broadcasting may be determined, as it is realized that at present the public is in a more or less optimistic state of mind and that broadcasting must be placed on a much more sound basis if it is to remain as a valuable service.

If the experimental broadcasting station in New York is commercially successful, it is our plan to establish, as circumstances warrant, similar stations throughout the country, and not only may each station have available for use in connection with it all of the local lines in the zone served by that station but also at some future time it may be possible that all of such broadcasting stations throughout the country may, if conditions warrant, be tied together by the long line plant, so that any one, from practically any point, may use any number or all of these stations simultaneously if he so desires. It is our thought that only in this manner can the best, cheapest, and most extensive radio broadcasting service be given.

It should be understood that this service will not react to the exclusion of private or other broadcasting service and will not necessarily in any way directly displace such services. However, it is obvious that every one cannot own his own broadcasting equipment, and unless some provision for service such as we have outlined is made, only a limited number of people in the country will have broadcasting service available for their use.

PRESENT LAWS AND PROPOSED REGULATIONS

The present radio laws, which were made originally in 1905 and later modified in 1912 and adopted by Congress, cover principally the international situation with reference to radio telegraphy, as radio telephone service was not practicable at that time. With the rapid development of radio telephony, particularly since the war, there has been a strong realization that the present radio laws are entirely inadequate for the present situation and not only is the international communication question now under consideration but also the national problem. During February the Secretary of Commerce appointed a committee to consider radio telephone matters. This committee first met on February 27 and has been carefully considering the requirements for radio telephony with the idea through subsequent legislation, of providing space in the ether for the necessary and real services. It is proposed in the preliminary report of the Secretary's Committee that a large part of the available space in the ether be set aside for various kinds of broadcasting, with a small reservation

The Captain of the Steamship America talking to persons on shore, at their homes and offices in radio tests that proved ship-to-shore service practicable

for ship to shore, for trans-oceanic and for fixed station service. The temporary assignments which the committee have suggested for the desirable uses of radio are naturally limited by the ether and by the character of practical apparatus so that no one of the services will probably receive as full an allotment as might be desired.

It is hoped that the proposed legislation will provide reservations in the ether for what now seems to be the possible applications of radio telephony to the public service in order that these applications may have an opportunity for development along proper lines. It is also desirable that there be established and maintained a rigid regulation of radio matters with the end in view that prime consideration will always be given to the necessary and essential uses of radio.

While we have important exclusive rights protected by patents, our interest in the extension of our field of service overshadows any interest in any patent or group of patents. Above all, we do not want to obstruct the work or play of scientists and amateurs. Progress follows experiment and use. In this new art we should experiment and encourage the experiments of others, but without prejudice to later enforcement of our rights if and when such enforcement becomes necessary to the efficiency of a public service.

The question of most interest in the Bell System is naturally—"What do we propose to do with radio?" We propose to keep in mind our main purpose which is to furnish to the people of the United States as wide a range of communication facilities as possible. It may mean service with ships, railway trains and airplanes. It may mean a trans-Atlantic service, but promises cannot now be made. It may mean broadcasting, the future of which cannot be determined as yet. It should be remembered that radio telephony, with its scope definitely limited by natural conditions, has only reach an elementary stage, even in its possible fields. Bearing in mind our fundamental policy of providing the best and most economical type of facilities to meet any given set of conditions, we shall continue our work of developing whatever possibilities there are for radio in the field of telephone communications.

Radio Communication Between Life Boat and Shore

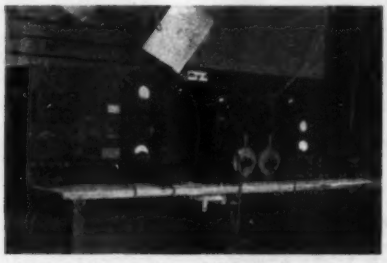
By S. R. Winters

EXPERIMENTS in the use of the radio-telephone as an agency in maintaining rapid communication between a motor life-saving boat and a station on shore have recently proved successful. The experiments were conducted jointly by the Radio Communication Section of the National Bureau of Standards and the United States Coast Guard Service, the latter contemplating the application of radio-telephony as a life-saving device at several of its coast-guard stations.

The coast guard boat on way out to sea to make tests

Seafaring vessels are most frequently wrecked in stormy weather and the rescuing crew necessarily have to perform its services quickly and without encumbrances on the life-saving boat. Dangling wires or the towering antenna common to the conventional wireless transmitting and receiving outfits obviously could not be used. Therefore, the coil antenna, by reason of its compactness and non-requirement of insulation from the earth, was selected as the form of apparatus for conducting the novel experiments.

Two vertical pipes grounded at each end and having a connection made across their upper ends proved a satisfactory arrangement. A coil antenna previously developed for use on submarines, offered a sort of model for the design installed on the motor lifeboat. The boat subjected to the unusual observation-tests was thirty-six feet long, propelled by a gasoline engine, and was equipped with a substantial metal keel. The receiving and transmitting wireless outfit was installed as far forward on the motor-boat as possible and from the apparatus was extended forward a wire which was connected to the keel. Two other wires, heavily insulated, were run aft along the guards and welded to the keel. Thus, it is seen, a particular design of coil antenna was shaped, of which the keel was an integral part.



Transmitting and receiving equipment used in the tests

The transmitting outfit employed on the boat and the one at the station on shore were in agreement as to design and capacity. The unit consisted of a 5-watt radio-telephone and a receiving set. The wavelength selected for transmission from the boat was 380 meters; from shore 675 meters. The receiving outfit included three stages of radio-frequency and two-stages of audio-frequency amplification. The transmitter proved powerful enough to maintain effective communication with the land station when the boat had sailed six miles from shore. This distance is adequate to the usual demands of the life-saving service and the tests proved eminently satisfactory.

Radiophone installation on U.S. Coast Guard life boat

The Popularity of Radio Is Providing Cartoonists

LISTENING IN

LOOKY WHAT POPPY BROUGHT FOR YOU IT'S A WIRELESS TELEPHONE
OH - THIS IS WONDERFUL! SOMEONE IS TELLING A FAIRY TALE FOR LITTLE FOLKS
YEH?
SH-H-H!
BY GEORGE A BAND IS PLAYING NOW — JUST AS PLAIN
THE REVEREND I.M.BLUE WILL PREACH HIS EVENING SERMON
POPPY WILL LET YOU LISTEN A LONG-TIME

—Hungerford in Peoria Journal

THE ORIGINAL BROADCASTING STATION

I GOT HIS WAVE-LENGTH! HE WANTS T' HIT DE OLE BOTTLE!
SOUNDS T'ME LIKE A PIN'S STICKIN' HIM!
MAMMA KNOWS HIM GOT A LITTLE UPSET TUMMY!
OUR WIRELESS YELL-EPHONE -

—Johnson in Des Moines Capital

"ANOTHER GOOD THING GONE WRONG"

CONGRESSMAN
MY DEAR FELLOW CITIZENS — HOT AIR
WE POINT WITH PRIDE AND VIEW WITH ALARM — ETC. — ETC.
THE GOOD OLD BUNK — ETC.
IN FACE OF THE COUNTRY DEMANDS OUR RE-ELECTION — ETC
I ASK YOU TO LOOK AT MY RECORD
TALK - TALK
HOT AIR
PSHAW! I MIGHT AS WELL DISMANTLE THE THING NOW.
WHEN DOES THE MUSIC START, PA ?
RADIO FAN

—Smith in Atlantic City Gazette

"A BUSY WIRE"

—Judge

FOR PEOPLE WHO CAN'T WHISTLE

—N. Y. Globe

With Ammunition For Their Oscillating Penpoints

THRILL THAT COMES ONCE IN A LIFETIME

I TRIED T' GITA LITTEN KINGE IN DUTTIN A 3 V PLATE VARIABLE CONDENSER IN MY GRIDDING CIRCUIT VIA CAN INDUCTANCE TO SOME LENGTH RANGE OF 'IN CIRCUIT' CONNECTION TO THE SECONDARY OF THE CONDENSER ALWAYS TO FOLLOWED
I WRITE AN' ASK IF A LOCAL COUPLER AN' 3 HOOK-UP COILS USED IN PLACE OF VARIABLES SHOULD BE AS GOOD AS TO STRUNGED HOOK-UP COIL SET; THEY TOLD ME THAT A SINGLE CONDENSER SHUNTED THE SECONDARY OF THE COUPLER AN' TO GOOD ON VARIABLE GRIDDING SET; ACTUALLY AS TO STRUNGED HOOK-UP COIL SET; HOW'D I LIKE TO CONDUCT IT'S PUT OUT TO PASTURE?
THE OWNERS OF RADIO PHONES SPRING SOME TECHNICAL STUFF FOR THE BENEFIT OF THE LAYMAN

—*Webster in Sioux City Journal*

HOW MOTHER GOOSE MIGHT HAVE BEEN WRITTEN

THERE WAS AN OLD WOMAN WHO LIVED IN A SHOE.
SHE HAD A FLOCK OF CHILDREN AND KNEW JUST WHAT TO DO-
FOR SHE DIDN'T WHIP THEM, NOR SEND THEM TO BED:
SHE STRADDLED A RECEIVER ON EACH LITTLE HEAD.
OH, PRUDENCE. COME ON AN HEAR T' BAND PLAY!
TELL TH' GANG TO HURRY! LISTENIN' IN!!
HURRY! JIMMINY CRICKETS!
NOW CHILDREN IF YOU'RE GOOD MAYBE WE'LL LISTEN IN ON K.D.K.
WHAT WE'D HEAR S'MORE FUNNY JOKES TONIGHT!
W.J.Z. TO NIGHT

—*N. Y. Globe*

OUR OWN RADIO RAVINGS

WAVE LENGTH ZKXTMVOBLAA

A FRIEND DROPS IN AND THE FAMILY MAKES HIM SIT DOWN AND LISTEN TO A HUMOROUS MONOLOGUE, DELIVERED BY PHILIP J. MUMBLEVOICE FIVE HUNDRED MILES AWAY.

DAD SAID HE BOUGHT THAT RADIO OUTFIT FOR ME AND HE HASN'T LET ME LISTEN TO IT ONCE
I'M SORRY WE HAVE ONLY ONE RECEIVER ON THE MACHINE-I'LL BET IT'S A SCREAM
ERK ERK BLAA BLAA AND I SAID TO HIM BLUK UMP CLICK
SOUNDS LIKE SOMEBODY FRYING EGGS

—*Dallas Journal*

JEFF KNOWS THEM ALL

SIR SIDNEY GAVE LITTLE CICERO THIS EXPENSIVE RADIO OUTFIT BUT I CAN'T GET IT TO WORK. IF I KEEP ON FOOLING WITH IT I'LL PROBABLY RUIN IT!
I'LL TAKE IT TO AN ELECTRICIAN. I WISH I KNEW OF A GOOD ONE!
GOOD MORNING, MUTT OLD DEAR!
CHERIE! JEFF, DO YOU KNOW A GOOD ELECTRICIAN?
DO I KNOW A GOOD ELECTRICIAN! I'LL SAY I DO!
WHAT'S HIS NAME?
KID EDISON!

—*Birmingham News*

What Newspaper Editors Say

Press of the Country, Reflecting Public Attitude Declare for the "Era of the Radio"

THAT the public still is greatly mystified and highly interested in the sudden popularity of the radiophone is reflected in the press of the country. Minds which are not held down to the technical limitations of wireless have soared to undreamed of heights with the first taste of the new form of communication. Thus we find the *Wheeling (W. Va.) News* saying that the statement of a high telephone official that the field of radio is limited "will not hold."

"At the present time," the newspaper says, "there is no doubt that the situation looks that way. But to us, unfamiliar as we are with the scientific details of wireless, it would appear an easier task to make this field unlimited, than it was to bring radio to the surface in the first place.

"Just now there is hardly a chance of radio supplanting telephone and telegraph wires, but at one time the steamboat was never thought to be a practical means of transportation; the automobile was nothing but a toy and the airplane would never be made safe. Scientific minds are bound to improve radio. The statement of the official will not hold."

The *Temple (Texas) Telegram* calls this "The Era of the Radio," and adds that the "possibilities of radio in achieving many improvements and creating many new advantages in the every-day affairs of men are developing so rapidly that the mind scarcely has time to grasp the scope and application of one phase of radio activity before a newer and more startling announcement of its possibilities is proclaimed to the world."

"Broadcasting speeches, music and entertainments has been demonstrated as practicable and economical."

The newspaper adds:

"Among the latest announcements of the utilization of radio communication is the proposal of a great trans-continental railroad system to install radio phones on its Pacific coast through trains by means of which its passengers will be enabled to keep in direct communication with their business or social affairs without interrupting their travels. Tests now being made by radio companies will determine whether this installation on fast moving passenger trains is practicable.

Education via Radio

"Of greater moment, however, is the announcement from New York, that with further development of radio service it will be possible to acquire a complete college education at one's home without the expense and incidental temptations for the student actually going to a university. One institution in New York, of national fame, has announced that a broadcasting station will be established in Washington Square in Greater New York through the instrumentality of which classes in all its university courses will be conducted.

"With such developments as these so early in the practical application of the radio wireless service the mind is staggered in contemplation of the marvels that seem sure to follow. It is to be accepted that there will be equal additional development in this line of scientific research as there has been in the field of practical electrical appliances, which means that the world is just at the threshold of the wonders of the radio."

Many newspapers are calling the interest by the public a "fad" or a "craze." Thus we find the *Oshkosh (Wisc.) Northwestern* referring to it as "the latest popular craze" and adding that the rapid spread of "this fad has caused experts to predict and foresee in this new method of communication the possibilities of important and far-reaching changes that will affect various phases of business and social life."

May Address Millions

"It is suggested that this offers an opportunity for a new kind of political campaigning. Instead of speaking to a few hundreds, or thousands, a campaign orator will be able to address a radio audience of many thousands, or even millions, at one time, and scattered over a wide area. In fact, there are so many strange possibilities connected with this new device for utilizing the mysterious ether waves that one wonders where it will lead to."

Many of the accomplishments of wireless are so marvelous to the non-technical mind that they liken the results to wizardy. The *Worcester (Mass.) Post* heads an editorial "Wireless and Wizardy," and in speaking of radio communication between a flying airplane and racing auto, it declares that radio is "man's greatest conquerer of space and location." And the *Austin (Texas) American* thinks that times will "be so changed, with so many now unthought-of marvels, that the people of 1942 will yawn at us, just as we look bored when an old soldier reminisces."

A bare announcement recently that talking movies through the use of radio, had been successfully demonstrated in Chicago immediately caused many editorial minds to leap into the realm of speculation. We thus find the *Shamokin (Pa.) News* declaring solemnly that "it is not straining the imagination to picture a day when moving pictures themselves will be broadcasted into homes by wireless, the same as a photograph now can be cabled across the ocean."

Newspapers, too, are enthusiastic about the possibilities of transmitting news by radio and thus increase the prestige of their respective dailies. Says the *Los Angeles (Cal.) Herald* editorially:

"The latest news of the city and the world, available by merely taking down a telephone receiver—this would seem to be the acme of comfort in the pursuit of daily information. But this is what is being made available to people within a radius of 2,200 miles daily, through the enterprise of *The Evening Herald* in its new radiophone news service.

"And you do not even have to be a subscriber, although you do have to put up your own radio receivers; but the news service is absolutely free. From information received it is already proving a boon to ships at sea, to those isolated on Pacific islands and to people in out-of-the-way places west of the Rocky mountains. Indeed, many hotels in small towns remote from large city newspapers are installing receiving apparatus in order to keep their guests informed on the latest doings in the great world around them.

"This service is rendered every day except Sunday, at 5 o'clock in the afternoon, which means that the news of Europe up to midnight and of the East up to 8 or 9 o'clock is covered and announced 'before it happens'—because of the difference in time."

And finally we see the press widely awake to the extreme importance of radio and soundly criticizing public officials who may or may not be negligent about the installation of radio equipment on vehicles of water transportation.

Law Needs Amendment

"Radio has saved thousands of lives on the sea," says the *New York Evening Mail*. "In 1902 the S. S. Philadelphia was provided with radio for emergency. In 1912 a law was passed that made it necessary for ocean-going vessels to carry a radio station.

"Recently a seaplane set out from Miami, Fla., to Bimini. It carried seven persons. The plane developed trouble en route as planes often do, and it had to alight upon troubled waters. In a few hours it was at the mercy of a restless sea.

"What happened to its wireless apparatus? It did not have any! If it had been provided with a low-power transmitter, all of the passengers would have been saved. A few SOS signals would have brought plenty of assistance.

"Does Mr. Hoover know that seaplanes are allowed to carry passengers over forty miles of watery waste without a radio outfit? If he does, let us hope that he will act to prevent further loss of life. Our radio law needs an amendment that will force the owners of seaplanes carrying passengers to install a radio outfit. It is the only assurance of safety these crafts can offer when they are drifting helplessly on the bosom of a mad sea."

WORLD WIDE WIRELESS

Radio Telephone Conference Report

THE Radio Telephone Conference, called some time ago by Secretary of Commerce Hoover to help solve the present chaos in the air, rendered its final report, on April 27.

"It is recommended," says the report, "that the wave band assigned to amateurs, 150 to 275 meters, be divided into bands according to the method of transmission, damped wave stations being assigned the band of lowest wavelengths, interrupted or modulated continuous wave radio telegraph stations the next band, radio telephone stations the next band, and, finally, unmodulated continuous radio telegraph stations the band of highest wavelengths. It is recommended that amateurs be permitted to carry on broadcasting within the wavelength assigned by the Secretary of Commerce to amateur radio telephony."

Recommendations are made that the Secretary of Commerce assign to each radio telephone broadcasting station a power range of 600 land miles for Government stations, 250 miles for public broadcasting stations, and fifty miles for private and toll broadcasting stations; that the same wave band or overlapping wave bands should not be assigned to stations within these distances of each other: Government, 1,500 miles; public, 750 miles, and private and toll, 150 miles.

The conference adopted at its final meetings a new provision recommending that the operation of Government stations be conducted in such a manner as not to interfere with commercial traffic and broadcasting.

The report recommends the appointment by the President of an advisory committee to the Secretary of Commerce to consist of twelve members, half of whom shall be from the Government and half from civil life.

The general allocation of wavelengths provides: Trans-oceanic service, 6,000 meters; fixed radio telephony, non-exclusive, 3,300; mobile service, non-exclusive, 2,650; Government broadcasting, 2,050; aircraft, 1,550; city and State public safety broadcasting, exclusive, 285; amateur, 275.

New Swiss Radio Station

A HIGH-POWERED, loud-speaking wireless telephone station is being installed at Lausanne, Switzerland, by means of which it is planned to hold daily communication with the Eiffel Tower in Paris. The apparatus will be capable of receiving messages from London, Berlin, United States and airplanes flying over Western Europe.

Maj.-Gen. George O. Squier using electric lamp socket to receive radiophone broadcasting

Annual Report of the Radio Corporation

THE trans-Atlantic circuits of the Radio Corporation of America are now carrying 20 per cent. of the messages between this country and Europe, according to the annual report of the corporation.

Out of a gross income of $4,160,844 in 1921 the corporation made a net profit of $426,799. This amount was applied against reserves for depreciation of patents, which the directors believe inadequate.

The year 1921 was largely devoted to increasing the efficiency and capacity of existing communication channels and to extending, through present European correspondents, connections with othe rcountries by wire telegraph. Thus there has been provided indirect service to almost the entire world, except South Ameriac.

Six direct international radio communication circuits are now in operation by the Radio Corporation of America: Great Britain, opened March 1, 1920; Norway, opened May 17, 1920; Germany, two circuits, the first opened August 1, 1920, and the second May 19, 1921; France, opened December 14, 1920; Hawaii and Japan, opened March 1, 1920.

The installation of high-power stations in South America has been inaugurated, by joint arrangement with the French, German and English companies, under which the interests of the four companies are trusteed, with an American chairman chosen by the Radio Corporation of America. A station is now being erected in Argentine, and a concession has been obtained and financial commitments made in Brazil. At Warsaw, Poland, the Radio Corporation of America is now erecting a high-power station. One-half of the necessary radio equipment has been forwarded to Poland from the United States, and American engineers are making the installations.

The new receiving station for trans-Atlantic radiograms is at Riverhead, L. I., where the one antenna consists of two copper wires nine miles long strung on telephone poles, and receives simultaneously messages from Norway, England, France and Germany.

The erection of radio telephone broadcasting stations in various parts of the United States has resulted in a great demand for radio telephone receiving apparatus. The demand came up overnight and apparatus embodying the latest improvements and of a character suited for general use has now been developed for manufacture in large quantities, and it is believed by the officers of the corporation that the demand, large though it may be, will soon be filled.

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S.S. Iowa Radio Tests Postponed

THE proposed gunnery tests of the Atlantic fleet, with the wireless controlled U. S. S. Iowa as the target, scheduled for May 1, have been postponed indefinitely in order to effect fuel economy, the Navy Department has announced.

Development of Radiotelegraphy in Czecho-Slovakia

FOR some time, the Ministry of Post and Telegraph of Czecho-Slovakia has been planning to build a central wireless station, with subsidiary stations in different parts of the Republic. With this end in view, the Ministry has carefully followed all inventions in the field of radiotelegraphy and has sent its engineers to foreign countries for the purpose of studying wireless systems already in operation.

A station will be built at Podebrady, Bohemia, equipped with high-frequency generators (Letour-Bethenod type), producing 50 kilowatts of energy at the antenna. The entire station with two towers, 500 feet high, will be capable of generating additional energy up to 100 kilowatts at the antenna. When the need warrants the expansion, another generator developing 50 kilowatts of energy will be installed. The radius of transmission will be about 2,500 miles.

The Podebrady station will also be the main sending station for Prague, and wireless telegrams filed at Prague will be transmitted by it. In addition to the main station, the State Post and Telegraph office at Podebrady is building a smaller station, equipped with vacuum tubes.

At Kral Vinohrady (a district of Prague) a wireless station with a radius of 250 miles is operated in connection with the Main Post and Telegraph office. At Brno (Brunn), Moravia, a radio plant has been constructed recently with a range of 600 to 900 miles. Tests of the apparatus and service between these two stations were made at the end of January and proved entirely successful. Further tests are now being made between Brno and radio stations in other European countries.

For radio communication between Slovakia and Prague, as well as with the Orient, a new station is being erected at Kosice, Slovakia, while still another at Bratislava will be operated for the benefit of the shipping on the Danube and for the International Danube Commission, now sitting at Bratislava.

A radio sending and receiving station has been projected for Liberec (Reichenberg), and the authorities state that they hope to have it completed before the opening of the Third International Sample Fair, which will be held in that city from August 12 to 20 of this year. The State Telegraph office at Karlovy Vary (Carlsbad) also desires to establish a small radio station at that point before the season opens at the baths.

Because of the importance of radio communication to aerial navigation, the Czecho-Slovak Ministry of Post and Telegraph and the Ministry of National Defense are now building a wireless station with a range of 600 miles at the Kbely (near Prague) aerodrome, the starting point of aeroplanes for Paris and Warsaw. In Western Bohemia, at Plzen, or Cheb, a station will be established in connection with the air service to Paris and another in northeastern Bohemia, with that to Warsaw. The Prague, Brno, Bratislava, and Kosice wireless stations will also serve the air fleet. In addition to these joint plans a Ministry of National Defence is proposing to build its own wireless stations for military purposes.

Bankers and industrial concerns in Czecho-Slovakia confidently expect, in a very short time, to be receiving information by wireless from the Bourses of London, Paris, Berlin, Zurich, Amsterdam, and New York.—*By C. S. Winans, American Consul, Prague, Czecho-Slovakia.*

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Ban on Political Speeches From Government Stations

UNTIL a definite policy has been established by the Government regarding the use of naval radio telephone equipment for broadcasting, no further political speeches or lectures will be sent out. This decision of Mr. Denby to curb the general use of naval equipment followed an investigation into the use of broadcasting stations by members of Congress for addressing their constituents.

Democratic members declared that the use of Government radio facilities had been granted only to Republicans, and the Secretary of the Navy, determined to put an end to the growing confusion pending the determination of a definite policy by this body.

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Navy Radio Bill Signed By President Harding

THE bill extending use of the Government's naval radio facilities for commercial and press purposes until June 30, 1927, has been signed by President Harding.

As passed by the House the measure authorized the extension of the use of such facilities only until next June 30. The Senate amended it by making the extension until June 30, 1927. The compromise does not apply to messages to China.

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Music from Schenectady to San Francisco By Radio

SAN FRANCISCO has listened to spoken words and instrumental music played in New York State carried by radiophone over more than 3,000 miles.

For more than four hours the music and conversation transmitted on the Atlantic Coast was checked up by radio engineers at the Rock Ridge station in Oakland and at the office of the Morehead laboratories, San Francisco.

The significant feature of the test in the development of radio telephony, is that it was transmitted with low power on a short wavelength, available to amateurs.

The test was arranged through the co-operation of the General Electric Company of Schenectady and the Atlantic-Pacific Radio Supplies Company of San Francisco.

Three and a half kilowatts of power were used in transmission on wavelengths of 360 meters.

The receiving set at Rock Ridge, Oakland, was equipped with two stages of radio amplification and two of audio amplification.

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N. Y. State Incorporates Many Radio Companies

TAKING advantage of tremendous interest being shown these days along radio lines, many companies were incorporated in this State last month for the purpose of manufacturing radio apparatus. A summary issued by Secretary of State John J. Lyons covering the activities of the corporation bureau last month as well as furnishing comparative figures for the first quarter of this year and the same period in 1921, furnishes additional proof that the hesitancy which characterized companies embarking in business is rapidly becoming a thing of the past.

During the month of March, a total of 1,717 companies having an aggregate capitalization of $58,411,250, were incorporated by Secretary of State Lyons. These figures represent an increase over February of 284 companies and a capitalization of approximately $7,000,000.

Chevrolet to Use Radio in Auto Race

A WIRELESS telephone will be used by one driver in the 500-mile automobile race at the Indianapolis motor speedway May 30 to keep in touch with his pit during the long grind. The car, a small one of popular make, but rebuilt for racing purposes, was designed by Louis and Arthur Chevrolet, of Indianapolis. Louis Chevrolet designed and built the winning cars in the 1920 and 1921 races.

Pointing out that drivers and mechanicians lost track of their standing in the long race after they have gone several laps, the Chevrolet brothers declared the wireless telephone will enable the automobile pilot to keep in constant touch with his pit and know at all times his place and other valuable information.

Jack Curener, of Greenville, Ohio, who has been selected to drive the car, is in the city working on it. To make the use of the wireless possible a small device will be placed on the rear of the car to catch the waves as the machine speeds around the track.

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Illegal Possession of Radio Tubes

WITH the arrest of Jewell Van Dyke and his brother Carl, heads of the Van Dyke Electric Company, Asbury Park, N. J., by a United States Deputy Marshal on a charge of illegal possession and displaying for sale Government radio tubes, officials at Camp Vail announce the belief that many amateur radio operators possess stolen tubes and on May 1 a drive to recover them will be made.

The Van Dykes were held in $1,000 each by United States Commissioner Carton. It is alleged that United States "V. T. I." radio tubes were found at their store.

Since their arrest many tubes had been returned to the camp. The Van Dykes said they were unaware that the tubes bought by them had been stolen.

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Radio to Link America With Sweden

FOR the first time in history Sweden and the United States will have direct telegraphic communication through the erection of a high-power radio station which is to be constructed immediately on the Swedish west coast. Heretofore all cable or radio communications between the two countries were relayed from London or Paris.

The Riksdag long ago appropriated the initial sum of 2,000,000 kronor, more than $550,000, to begin the work, but it was not until recently that the Swedish State Telegraph Board and the Radio Corporation of America reached a satisfactory agreement, under which the fees for all radio traffic will be divided equally between the two countries.

It is calculated that the cost of the new station will not exceed 5,000,000 kronor, about $1,400,000. One reason for an immediate start is the serious unemployment situation in Sweden.

The total telegraphic traffic between Sweden and North and Central America amounted last year to 1,660,000 words. The head office of the new station will be located in Gothenburg.

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Bank Payments Ordered By Radio

THE Farmers' Loan and Trust Company announce that arrangements had been completed with the London Joint City and Midland Bank, Limited, which will enable wireless payments to be made at any time to passengers en route on board the Mauretania, Aquitania and Berengaria. Through branch banks on board these ships passengers also may order payments made through the Farmers' Loan and Trust Company to persons in this country.

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Direct Wireless Between England and Australia

THE Amalgamated Wireless (Australasia), Limited, of Sydney, has been authorized to establish and conduct direct wireless communication between Australia and England, and also to take over and develop the entire Australian wireless services. A new board of directors will be formed for the Australian wireless company, which will consist of seven, three representing the Commonwealth Government, three representing the Amalgamated Wireless (Australasia), Limited, and a seventh director to be selected mutually.

Within two years Australia will be in direct communication with England through high-powered wireless stations erected in each country, and a commercial wireless service will be available at rates for all classes of traffic which will be two-thirds of the existing cable rates.

Radio on Airplanes

SEAFARING airplanes will be as safe as a chair at the opera if all the new regulations announced by Secretary of the Navy Denby are strictly enforced.

The regulations provide that all airplanes that make long passages be equipped with radio sets of sufficient strength to communicate with a ship or station at the near end of the passage. It is also planned to install radiophone outfits on all mail machines. The apparatus will have an operating radius of 200 miles to afford the pilot constant contact with the station just left or the one ahead.

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Radio Shows

THE Electrical Contractors' Association of Brooklyn and Queens will hold its first annual radio and electrical exposition at the Brooklyn Ice Palace, corner of Bedford and Atlantic avenues, from May 6 to May 20, inclusive.

Headquarters have been opened at the McAlpin Hotel for the Radio Show which will be held at the Seventy-first Regiment Armory, Thirty-fourth street and Park avenue, New York City, the week of May 22-29.

Announcement of a National Radio Exposition to be held in the Leiter building, Chicago, June 26 to July 1, has been made by Milo E. Westbrooke, its manager.

The annual Chicago Radio Show will be held in the Coliseum in Chicago, from October 11 to October 22, according to a communication received from U. J. Herrmann, manager of the show.

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New English-Swiss Wireless Service

A NEW high-speed commercial wireless service between Switzerland and England is being carried on by stations which have been specially erected for the purpose by the Marconi Company in Switzerland and England, capable of handling traffic at a speed of 100 words per minute in each direction.

The signals received at the English end are automatically relayed to London, and there recorded in Roman characters. The English transmitting station is automatically operated from Radio House, Finsbury, London.

The usual telegraphic rates will apply to this new service and messages intended for transmission by this route are accepted at all Post Offices.

Charging Storage Batteries From A. C.

The Tungar Rectifier Provides an Easy and Safe Method for Keeping Batteries Fully Charged — Practical Instructions for Its Installation and Operation

By C. E. Hamann
General Electric Company

THERE are, according to Secretary of Commerce Herbert Hoover, 600,000 amateur radio operators in the United States, and the number is increasing with great rapidity.

With this large and growing number of radio outfits in use, the problem of charging the storage batteries used in connection with them, assumes corresponding importance and interest and the trend is naturally, in the direction of obtaining rectifiers for charging these batteries at home rather than transporting the batteries to and from a battery service station.

Practical installation of a Tungar outfit for charging storage batteries in the home

Gas-filled tube rectifiers are becoming increasingly popular for this purpose, but while considerable information has been published on the theory of the "hot cathode" rectifier, little or no data has been afforded the amateur on its practical operation in the radio station.

Among the successful types of rectifiers which have been in use for some years for charging automobile storage batteries is the Tungar, which has recently been developed for a similar purpose in charging radio outfit batteries. The practical application of this type for this purpose will be discussed in this article. These sets are made in various sizes, from a very small outfit for railway signal work, delivery only a fraction of an ampere, up to large service station outfits capable of charging ten or twenty automobile batteries simultaneously. For radio work the small, portable type, built in two-ampere and five-ampere capacities, is preferable.

No attempt will be made to describe the theory of the bulb. This is generally similar to the theory of the two-element vacuum tube, with which the average radio "fan" is familiar. A simple comparison can be made by comparing the action of the bulb to that of a one-way valve. During one-half of the cycle, current flows through the bulb from anode to cathode—that is, from "plate" to filament, but during the other half cycle, no current can flow; hence, the term "half-wave" rectifier.

At first thought it would seem that the efficiency of a "half-wave" rectifier" would be very low—not over 50 per cent. Further consideration, however, will reveal the fact that on the half-cycle, when no current is flowing through the bulb, no energy is being drawn from the line, except a small amount for heating the filament and exciting the transformer. As a matter of fact, some of the larger types of "half-wave" rectifiers have an efficiency as high as 75 per cent.

It is quite feasible to obtain "full-wave" operation by using two bulbs." Such an outfit, however, is more complicated, and necessarily, more expensive. Therefore, as a pulsating direct current is satisfactory in every way for battery charging, the simple half-wave rectifier is the type most commonly used.

Figure 1 shows an elementary diagram of connections for a rectifier using a Tungar bulb. The filament is excited from a low voltage source, such as a battery or a transformer. An adjustable resistance regulates the amount of charging current flowing through the battery. Obviously, an arrangement of this kind would not be satisfactory for every-day use. It would not be practical to excite the filament from a battery, as too much current would be required—the five-ampere bulb takes approximately 18 amperes at 2.5 volts for filament excitation. A resistance for regulating the charging current would be inefficient and wasteful. In order to overcome these objections, a small auto-transformer is used in the standard Tungar outfit.

In the five-ampere one-battery type the auto-transformer has two secondary windings, one consisting of a few turns of heavy wire for furnishing the filament current, and the other consisting of a greater number of turns

for supplying the current for charging the battery. Three taps are brought out near the end of the primary winding which are used to adjust the outfit for various line voltages.

Because of certain characteristics of the bulb, the auto-transformer must be carefully designed. The voltage required to make the bulb "pick up" or start rectifying, is considerably higher than the voltage necessary to maintain the arc after the bulb starts operating and an arrangement is therefore provided to lower the voltage as soon as the bulb starts rectifying—to prevent burning out the bulb. This inherent reactance regulation has an additional advantage in that it tends to hold the charging current more nearly constant when the line voltage varies.

sidered is the load on the battery; that is, the extent to which it will be discharged when operating the receiving set. If only a single tube outfit is used, the discharge rate will be only about one ampere. Figuring roughly that the receiving outfit is in operation an average of three hours per day, then the total discharge would be three ampere hours. In this case the 2-ampere size would be entirely large enough, regardless of the size of the battery. Operating the rectifier for one and one-half to two hours per day would keep the battery in a fully charged condition.

On the other hand, if a 3-tube receiving set is used, the total discharge of the battery will be nine ampere hours per day on the basis of operating the set three hours per day. To

station and go away, leaving the battery charging. Should the A.C. line voltage fail at any time, it is impossible for the battery to discharge back through the Tungar.

A simple and convenient way of connecting the rectifier to the battery is by means of a double throw, double pole switch, as shown in figure 3. This arrangement has a safety feature, in that the rectifier cannot be connected to the battery without first disconnecting it from the receiving set.

If this switching arrangement is not used, the operator should always bear in mind the fact that the receiving outfit must be disconnected while charging. If an attempt is made to operate the receiver while the battery is charging there will be a very loud, disagreeable hum in the phones, par-

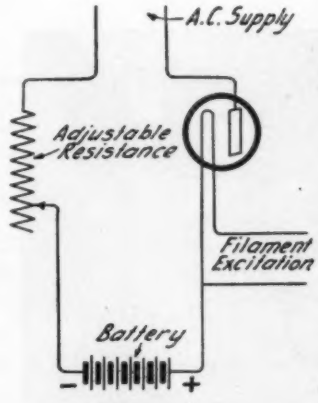


Fig. 1

Elementary diagram of connections

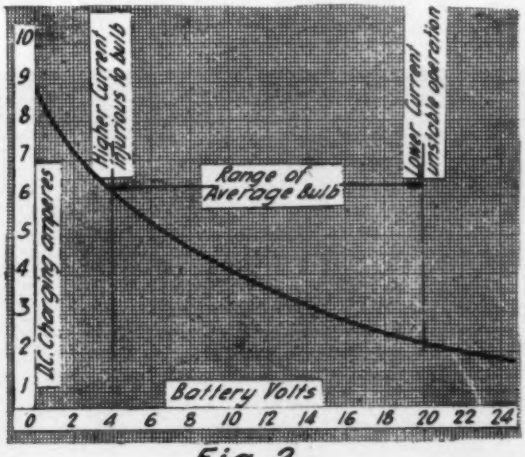


Fig. 2

Electrical characteristics of the 5-ampere type

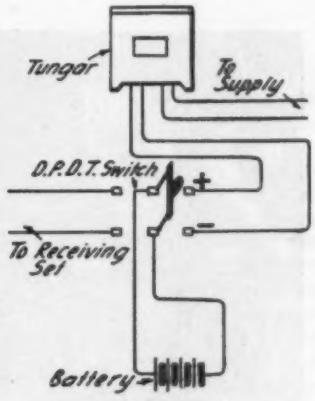


Fig. 3

"Safety first" method of connecting the rectifier to storage battery

Figure 2 is a curve showing the charging current obtained with various numbers of cells of battery connected to the outfit. This curve was made with a five-ampere outfit. It will be seen that the rectifier delivers approximately five amperes with a 3-cell load, and three amperes with a 6-cell load.

When choosing a Tungar for use in the radio station, several things must be taken into consideration. First, is the selection of the proper size of outfit. The choice of a 2-ampere or a 5-ampere Tungar is not, as it might at first appear to be, simply a question of the relative fatness or slimness of one's pocketbook. Each of these machines has its own field of usefulness.

In general, if the battery to be charged is of low capacity—as for example, not over 40 ampere hours—the 2-ampere size should be selected. For larger batteries the 5-ampere size is preferable, as it will charge the battery in a much shorter period of time.

Another point that should be considered is the load on the battery; that is, the extent to which it will be discharged when operating the receiving set. If only a single tube outfit is used, the discharge rate will be only about one ampere. Figuring roughly that the receiving outfit is in operation an average of three hours per day, then the total discharge would be three ampere hours. In this case the 2-ampere size would be entirely large enough, regardless of the size of the battery. Operating the rectifier for one and one-half to two hours per day would keep the battery in a fully charged condition.

On the other hand, if a 3-tube receiving set is used, the total discharge of the battery will be nine ampere hours per day on the basis of operating the set three hours per day. To keep the battery charged with a 2-ampere rectifier would require a charging period of five or six hours per day, whereas with the 5-ampere size, a two-hour charge per day would be ample.

Many operators allow their batteries to run down completely before recharging. This has two disadvantages. Batteries have an exasperating way of going dead in the middle of some important DX work, or perhaps when a long-distance concert is being heard. When a battery is completely down, a long period of charging is necessary to bring it up. Meanwhile the station is out of commission.

The only sure way of avoiding these annoyances is to give the battery a short charge every day or two, thereby maintaining it in a fully charged condition. It will interest the amateur to know that the construction of the Tungar has been approved by the National Board of Fire Underwriters. This means that it is perfectly safe to put the battery on charge, lock up the station and go away, leaving the battery charging. Should the A.C. line voltage fail at any time, it is impossible for the battery to discharge back through the Tungar.

A simple and convenient way of connecting the rectifier to the battery is by means of a double throw, double pole switch, as shown in figure 3. This arrangement has a safety feature, in that the rectifier cannot be connected to the battery without first disconnecting it from the receiving set.

If this switching arrangement is not used, the operator should always bear in mind the fact that the receiving outfit must be disconnected while charging. If an attempt is made to operate the receiver while the battery is charging there will be a very loud, disagreeable hum in the phones, particularly if an amplifier is used. This is due to the pulsating current from the rectifier, which super-imposes a ripple on the straight-line voltage of the battery.

There is also another objection. As stated, the Tungar uses an auto-transformer. By referring to figure 1 it will be seen that there is a direct connection from the A.C. line through the auto-transformer to the battery. In practically all A.C. lighting systems one side of the line is grounded. In some types of radio receivers the connections are such that the filament circuit is grounded. Under these conditions it is possible to have a direct connection from the high side of the A.C. line through the rectifier and the receiving set to ground, and the resulting flow of current may be enough to damage both rectifier and receiving set.

If any experimental work is contemplated in which the Tungar will be connected to the radio set, it will

(Continued on page 56)

Recording High Speed Signals in Radio Telegraphy

By Julius Weinberger

Research Engineer, Radio Corporation of America

THIS paper deals with the development and operation of a practical system for the handling of radio telegraphic traffic at high speed, particularly in trans-oceanic communication. By high speed working we refer to operation at speeds greater than those customarily employed for telephonic reception, that is 20 to 25 words per minute by average good operators.

With the continually increasing expensiveness of equipment, and the tendency towards increase of transmitting power (so as to insure reliable communication at all times), it has become apparent that the profitable operation of a long distance radio system depends greatly upon working at a rate of speed in excess of that obtainable by hand. Most of the high power radio transmitters of today are equipped with relay systems capable of sending as high as 100 words per minute, and there is no particular reason why, if necessary, powerful vacuum tube amplifiers could not be built to take the place of relays and be worked at considerably greater speed. The limitation of working speed is practically confined to the receiving side of the radio system, so that it is obvious that increased speed possibilities must be obtained entirely by the development of receiving apparatus.

In order to understand the conditions under which high speed recording apparatus must work, it will be well to describe briefly the manner in which communication is carried on over the trans-Atlantic circuits of the Radio Corporation. Figure 1 illustrates the method of duplex working. It will be noted that the operation is from New York City, while the transmitting and receiving stations are placed at some suitably distant point; and it is intended to concentrate most of the Atlantic Coast transmitters in a central plant at Port Jefferson, Long Island, while most of the receivers are concentrated at Riverhead, about 18 miles from Port Jefferson. All control of the various transmitters and receivers is from New York City, the sending operator controlling a transmitter via telegraph line and the receiving operator having the received audio frequency signal brought to him via telephone line. The transmitting and receiving operators are located close to one another (at a common table), so as to facilitate duplex operation. The receiving operator can thus instantly communicate with the distant transmitter, if desired, in order to control the speed of transmission, or stop the transmission in case of trouble. The operators themselves handle no apparatus whatsoever; the receiving and transmitting apparatus is handled by engineers at the respective stations, and such apparatus as is necessary for wire transfer line at Broad Street is placed in a room separate from the operating room and maintained by men of suitable qualifications.

Figure 2—Part of the Radio Corporation operating room with the recorders in use

Requirements of High Speed Recording Apparatus

The foregoing operating arrangement, as well as certain service standards, imposes a series of requirements upon high speed recording apparatus which are given below:

1. Minimum delay between the time of recording and the time of transcribing the signals. This is of importance in

(a) Successful duplex operation: In case of trouble (for example, bad relay adjustment in the transmitting station) or for other reasons, it may become necessary to stop the distant transmitter. If the record is not immediately perceptible, a considerable quantity of traffic might be sent which was not properly recorded, and which would then have to be repeated with consequent loss of circuit time and delay in delivery.

(b) Prompt delivery of messages to the customer.

(c) Observation of the effect of adjustment of the receiving or transmitting apparatus.. It is essential that a minimum delay shall occur between the time a change of adjustment is made and the time the effect of the change is perceived.

2. The cost of recording must be as low as possible—not over a few hundredths of a cent per word. This is important since a large class of reduced rate traffic, such as press matter, deferred delivery messages, and the like, is handled at high speed. Furthermore, the future operating of short distance radio circuits with low rates must be taken into consideration, since the equipment designed for long distance working should be standardized for all classes of service if possible. Therefore the initial cost of the equipment must be low, as well as the operating and maintenance charges.

3. The recording equipment must be as simple and rugged as possible, and require no continuous attention; since it must be located near the receiving operators and handled by the telegraph supervisors, who generally do not have extensive technical or engineer qualifications. The parts of which the equipment is constructed should be

capable of easy repair in case of breakage, as far as possible, by the men and facilities available in the operating rooms, and spare parts should be capable of easy installation by such men. This is more important when

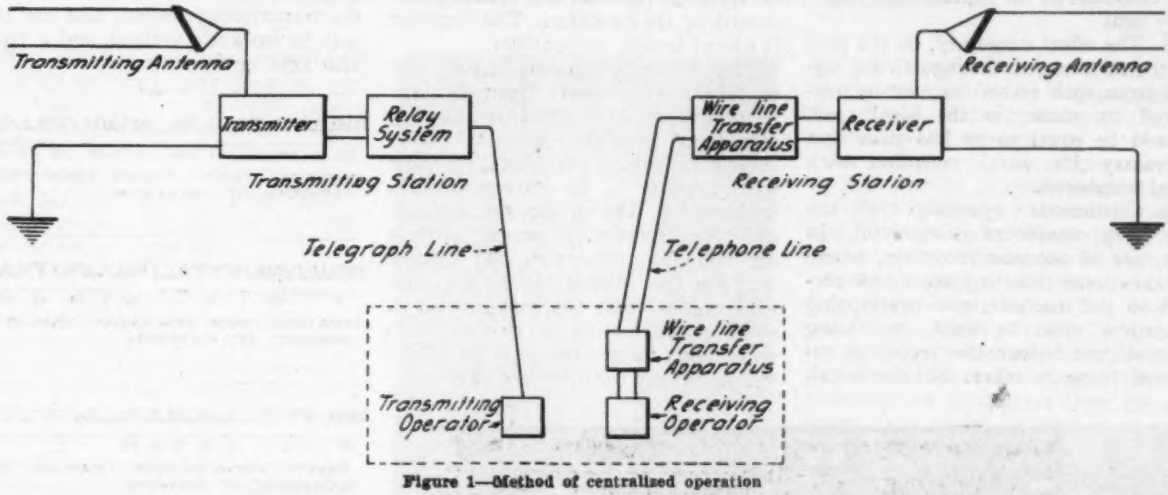


Figure 1—Method of centralized operation

recording equipment is furnished to stations other than those located in New York City (such as those in Hawaii or on the Pacific Coast), to which it would be manifestly very expensive to send expert repair men.

4. A record capable of preservation is highly desirable, so as to check up errors, and for use as a means of traffic study and general service improvement.

5. The tone signal which is sent over the telephone line from the receiving set may be anywhere between 500 and 1,500 cycles. Although the lines will transmit, theoretically, frequencies up to 2,200 cycles, it has been found in practice that better transmission is secured by keeping signals below about 1,500 cycles. The recording equipment must be capable of accepting any given frequency in this range, and allow for a considerable fluctuation above or below this frequency. It has been found in practice that at present frequency fluctuations of several hundred cycles must be taken into account with some European transmitters: though improvements in this respect no doubt will be made. A fluctuation of signal intensity of the order of perhaps 2 to 1 must be taken into account, due to accidental changes in line conditions, amplifier adjustments, or during tuning of the receiving equipment at the distant station.

6. Speed limitations: Present practice in long distance high speed working is on the basis of from 40 to 50 words (200 to 250 letters) per minute, and at times higher speeds, up to 80 words per minute, have been commercially handled. The limitation lies in relay trouble at the transmitting end and strays at the receiving end of the circuit. It is probable that working at 100 words per minute will eventually become the rule though not for a number of years. Hence, a recording system should be able to handle easily speeds up to 80 words per minute, and be so designed that extension to higher speeds (say, up to 200 words per minute) can be accomplished by simple modifications, for use on short-distance circuits. It is interesting to note, in this connection, that European short-distance radio circuits, for example, London-Paris, and London-Berlin, are understood to be operating regularly at 60 words per minute, and operation up to 100 words per minutes has been carried on at times.

7. The perception of the recorded signal by the operator should be made as easy as possible. The operator has not the time to study the record, and an easily perceived record at lower speed is preferable to one at a higher speed, which requires study on his part. For example, in graphic recorders the contrast between recorded signal and background should be great, the letters clean-cut, so that the operator perceives them instantly, and static eliminated from the record to the maximum extent consistent with accuracy. In acoustic recorders, such as the phonograph or the telegraphone, the signal heard by the transcribing operator must be clear and loud, free from musical static and with firmly-

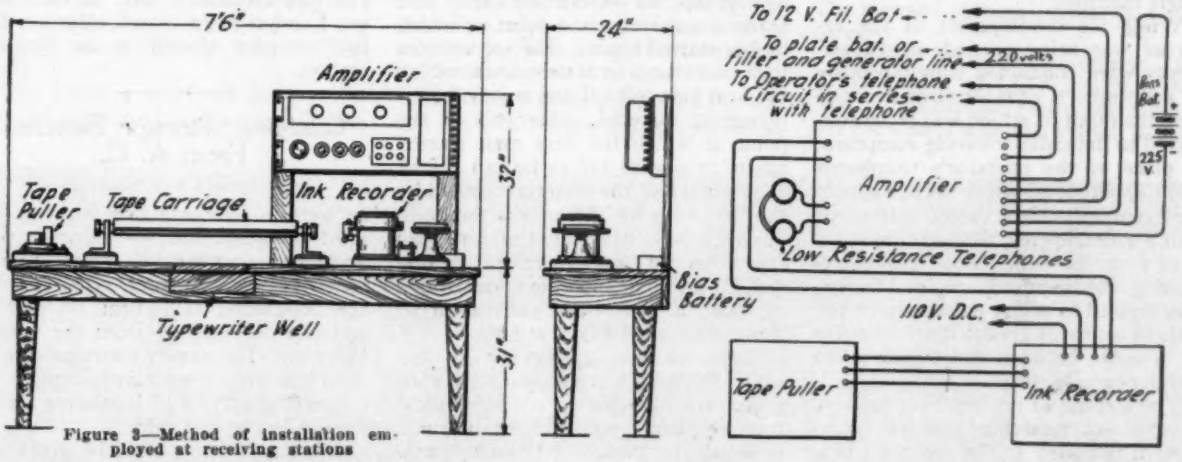


Figure 3—Method of installation employed at receiving stations

formed dots and dashes. It is difficult to over-estimate the importance of this requirement; it has a great influence on commercially successful operation, for the speed at which operators will handle traffic depends considerably on the clearness of the signals with which they deal.

8. The effort necessary, on the part of the operator, to distinguish the signal from such record as may be produced by static, in the ideal case, should be equal to or less than that necessary for aural reception with head telephones.

9. Continuous operation of the recording equipment is essential. In the case of acoustic recorders, where it takes some time to place a new record on the machine, two overlapping recorders must be used, one being started just before the record is removed from the other. But the installation of two machines is uneconomical and continuous operation should be provided for, in the ideal recorder, in a single machine.

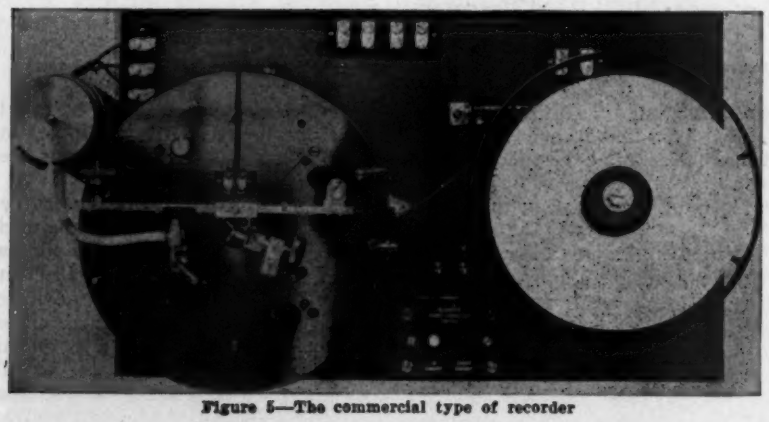


Figure 5—The commercial type of recorder

While the development of the recorder was being carried on, experiments were conducted simultaneously to determine a suitable amplifier system, the input of which was to be connected to the radio receiving equipment in place of the operator's telephones and the output of which was to supply the recorder with a direct current of 2 to 4 milliamperes, through the 1,000 ohm recorder coil. Aside from furnishing the required amplification, it was desired to utilize the amplifier circuits to secure as great a discrimination as possible between the signal audio frequency and strays.

The method of installation employed at outlying receiving stations is indicated in figure 3. The recorder, tape puller, and tape carriage are mounted on a common table, and a typewriter well is placed so that the operator may copy directly from the tape. The amplifier is mounted on a panel conveniently near the recorder, so that tuning or other adjustments may be made while their effect is observed.

In the central station of the Traffic Department of the Radio Corporation, New York City, the amplifier equipment is separate from the operating room. Here a special amplifier is employed in which the amplifications necessary both for wire line transfer and recording are combined. The recorder is placed beside the operator.

The above method of having one operator copy directly from the tape is suitable up to a speed of about 45 words per minute. Above this speed several operators may read the tape in succession, in the manner used in cable offices. That is, one man is placed near the recorder, a second perhaps ten feet along the tape, and a third man ten feet further along. The first man copies from the tape, which is moving faster than he can keep up with, until he reaches a point where the signals are nearly out of easy sight. He then stops copying, marks the point on the tape at which he stopped, and starts in again as near the recorder end of the tape as he can see easily and marks on the tape the point at which he has started again. The second man then starts copying at the point at which the first man left off and copies the intervening material, either up to the point at which the first man started again, or else as far as he can. If he cannot read all the material omitted by the first man he also marks the point at which he left off, and the third man completes the copy of the omitted material. By this method the transcription of traffic at 100 words per minute by three men is readily possible.

Figure 2 is a photograph of part of the Radio Corporation operating room, in which some of the recorders may be plainly seen. In this office, a recorder is placed on each transoceanic receiving circuit, and, in addition, arrangements are made to keep a record of the outgoing signals from each transmitter. This is accomplished by means of an antenna on the roof of the building, connected to receiving sets and recorders in the apparatus room; this equipment easily receives all of the local transmitting stations, and the signal leaving the sending operator's key or Wheatstone transmitter may thus be directly compared with the signal radiated from the transmitting station's antenna. In this way, line or relay faults, trouble in the transmitting station, and the like, may be instantly noticed, and a check also kept on operating errors.

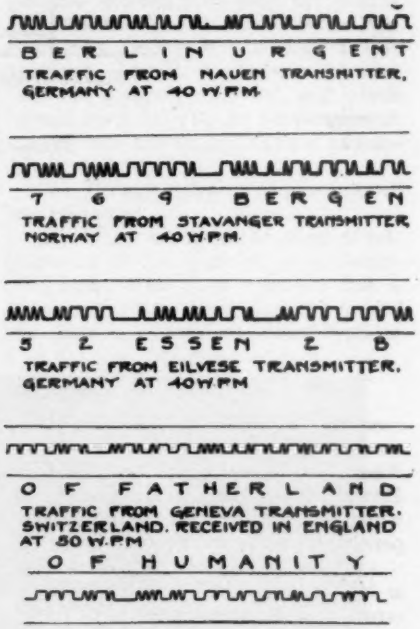

BERLIN URGENT
TRAFFIC FROM NAUEN TRANSMITTER, GERMANY AT 40 W P M
7 6 9 BERGEN
TRAFFIC FROM STAVANGER TRANSMITTER NORWAY AT 40 W P M
5 2 ESSEN 2 B
TRAFFIC FROM EILVESE TRANSMITTER. GERMANY AT 40 W P M
O F FATHERLAND
TRAFFIC FROM GENEVA TRANSMITTER. SWITZERLAND. RECEIVED IN ENGLAND AT 50 W.P.M
O F HUMANITY

Figure 4—Typical ink recorder tapes

In figure 4 a number of typical tape records taken on the ink recorder are reproduced. These are of various European transmitters recorded in the United States, while the last one is a record of the valve transmitter at Geneva (Switzerland), used on the Geneva-London radio circuit, taken on the ink recorder system at an English station.

Charging Storage Batteries From A. C.

(Continued from page 53)

be well to purchase one with an insulated transformer — separate primary and secondary — instead of the usual auto-transformer type. These are designated as "Form B" outfits, and can be obtained from the manufacturer. The same protection can be obtained with a standard Tungar by connecting a "1 to 1" insulating transformer in the line side.

The same care should be given the bulbs as is given radio tubes. In any experimental work connect a rheostat and an ammeter in the D.C. circuit so as to prevent a current of higher than five or six amperes from flowing. With reasonable care the life of Tungar bulbs will average 1500 to 2500 hours of actual service.

Remarkable Distance Records by 6XAD

Trans-Continental Work Done Repeatedly by Transmitter Employing Four Five-Watt Tubes—Signals Reported From New England, Bermuda, Alaska and Honolulu

PROBABLY the most remarkable distance work ever done by any amateur station of equal power using four 5-watt tubes is the station 6XAD, Avalon, Catalina Island, Cal., owned and operated by Lawrence Mott, Major, Signal Division O.R.C., U. S. Army, and President of the C.W. Association of America.

The consistent long-distance work done by Mr. Mott has attracted the attention of the regular army folks and quite recently the Chief Signal Officer of the Army, Major General George O. Squier, had several of the Signal Corps engineers make a comprehensive study of the station, including its equipment, geographical surroundings and accomplishments, in order to determine, if possible, the reason for the unparalleled results obtained.

At this point in the story it might be well to record the fact that Major Mott regards anyone who has never visited Catalina Island, as unfortunate, extremely unfortunate, in fact, in that they have missed enjoying one of the wonder spots of the world.

Anyway, 6XAD, is located in almost the center of Major Mott's wonderland, in an elliptical bowl of hills, whose highest point is 2,600 feet. The arms of this bowl run straight down to the island's shore where the waters of the Pacific lap lazily against the sands of the island where, according to Major Mott, the sun shines all the year round. The opening in the hills is toward the north-northeast, and the antenna points directly toward New York.

The antenna itself, of flat top design, is supported on two masts, one

Major Lawrence Mott, Signal Corps, O.R.C., U.S. Army, owner and operator of 6XAD

60 feet and one 94 feet high. There are seven wires in the antenna, standard Navy wire of seven strands, supported on an eight-foot spreader at the low end and on a sixteen-foot spreader at the high end, thus giving double spacing at the free end. Two-inch copper ribbons run along the spreaders, and each antenna wire is soldered to these strips, thus minimizing losses as much as possible.

The counterpoise ground of the station is of the same material and size as the antenna itself, and is stretched tightly nine feet above and parallel to the ground. The counterpoise is, of course, well insulated.

In addition to the counterpoise, an earthed ground is used, consisting of 240 metal plates, 3 x 4 feet, buried 3 feet underground. These plates are connected together by one-inch copper ribbons, leading in turn, to a 12 x 12-foot copper sheet buried five feet in the ground, directly under the operating table. In addition to these copper sheets, there are copper ribbons radiating out 30 degrees from the antenna. In order to insure a good earth ground connection the year round, metal standpipes have been put in and into these salt water is pumped every few days, thus insuring a moist condition of the ground over the whole area of the station. These metal standpipes are three inches in diameter and lead down to the buried metal sheeting at regular distances.

The station is equipped with the following transmitting and receiving apparatus:

The transmitter employing four 5-watt tubes, Radiotrons UV-202, is used principally for I.C.W. on 220 meters. The average antenna current is 2.6 amperes. It is with this set that practically all of the unusual distance work of the station has been done.

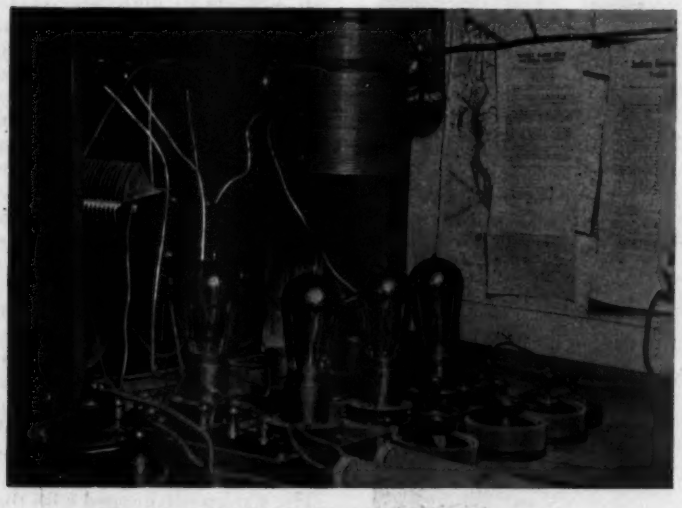
Another transmitter employs two 50-watt tubes for C.W. on 370 meters. The average antenna current is 4 amperes.

Another transmitter employs two 50-watt tubes of I.C.W., on 240 meters. Considerable experimental work has been done with this station in con-

Transmitting and receiving apparatus installed at 6XAD

nection with some forthcoming tests which are to be made with Australia.

Receiving equipment: Grebe CR-5, which has been used in all the unusual long-distance work of the station. A specially designed two-step Western Electric amplifier. A Kennedy long-wave receiver used in conjunction with a Grebe two-step audio-frequency amplifier.



Four 5-watt tube transmitter at 6XAD

The antenna system at 6XAD

A specially designed motor-generator set, capable of delivering up to 1,500 volts D.C. with 110-volt 60-cycle drive, is used to supply plate potentials for the various transmitting sets.

The stations which have been worked by 6XAD are as follows:

3 ALN	Washington, D. C.
3 AQR	Hershey, Pa.
5 HK	Oklahoma City, Okla.
5 ZA	Roswell, N. M.
6 AWP	San Francisco, Calif.
6 JX	San Francisco, Calif.
6 ZZ	Douglas, Arizona.
7 YL	Bozeman, Montana.
7 YJ	Corvallis, Oregon.
7 ZU	Polytechnic, Montana.
8 AWP	Syracuse, N. Y.
8 AXK	Cincinnati, Ohio.
8 JL	Cleveland, Ohio.
8 ZAC	Barnesville, Ohio.
8 BRL	Crafton, Pa.
8 LX	Crafton, Pa.
9 DVA	Denver, Colo.
9 AIF	Sioux Falls, S. D.
9 AIG	Sioux Falls, S. D.
9 ZN	Chicago, Ill.
9 AJA	Chicago, Ill.
9 AMB	Denver, Colo.
9 NX	Wichita, Kansas.
9 ZAF	Denver, Colo.
9 WD	Chicago, Ill.
9 DTM	Topeka, Kans.
9 AQR	Kansas City, Mo.
9 XI	Univ. of Minnesota, Minn.
9 XM	Univ. Wisconsin, Madison, Wisc.
9 XAQ	Univ. of Colorado, Boulder, Colo.

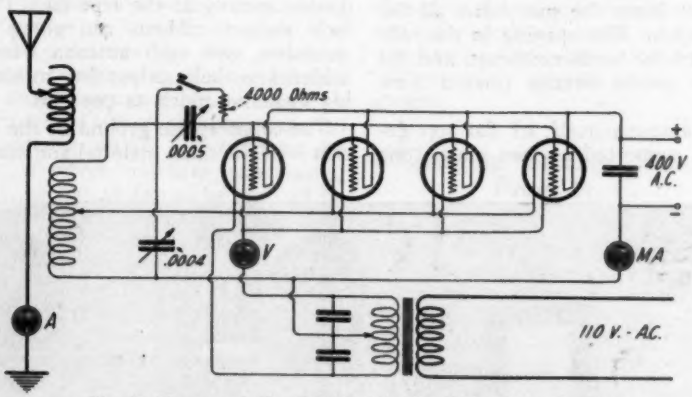
In the case of several stations in the Third and Eighth Districts these stations either worked or heard 6XAD after daylight had been on in the East for approximately an hour.

The number of stations which have reported the signals of 6XAD is so great that it was not possible to include a detailed list with this article. Included among them, however, were stations in Vermont, Massachusetts, New York, New Jersey, Pennsylvania, Virginia, District of Columbia, Georgia, Oklahoma, New Mexico, California, Arizona, Montana, Washington, West Virginia, Ohio, Kansas, Missouri, Nebraska, North Dakota, Colorado, South Dakota, Wisconsin, Illinois, Minnesota, and Ontario, and Saskatchewan, Canada.

The following stations have been heard at 6XAD during the past winter: 1ARY, 1BCG, 2FP, 3ALN, 3AQR, 3EM, 3FS, 3LR, 4BF, 4FT, 4BT, 4ZC, 5HK, 5JD, 5ZO, 5JB, 5XJ, 5ZA, 5QA, 5YQ, 5AAQ, 7LY, 7ZU, 7FI, 7ZT, 7YJ, 7MP, 7LN, 7AAV, 7NZ, 7JD, 7GO, 7CW, 8AG, 8AM, 8EA, 8BR, 8BK, 8LX, 8IV, 8BO, 8BK, 8AIO, 8CLD, 8AGQ, 8UY, 8AGO, 8SP, 8XV, 8VY, 8HAZ, 8IG, 9BBF, 9EK, 9BL, 9BEX, 9ALS, 9ZX, 9AIV, 9AAV, 9PI, 9BJI.

In addition to the reports from amateur stations already referred to several special cases were reported. The operator of the U.S.S. Lighthouse Tender Fern reported to Mr. Mott that the signals of 6XAD had been heard by him for several weeks up and down the Alaskan Coast, the maximum distance being 1,680 miles, chiefly overland.

Mr. Dow, of Maui, Honolulu, 6ZAC, has heard 6XAD frequently during the last few months, and it is hoped that a regular schedule between these two stations can be maintained.



Circuit diagram of the four 5-watt tube transmitter at 6XAD

The operator of a ship recently wrote Mr. Mott that 6XAD had been heard by him while his ship was at anchor, at Hamilton, Bermuda. Mr. Mott would like further details should this article come to the attention of the operator in question.

Train Radiophone Test Successful

Voice Communication Carried On Between Lackawanna Limited and Stations Along the Route Between New York and Scranton

By David W. Richardson

IN 1914 the Lackawanna Railroad instituted the world's first wireless communication from a moving train to stations located in the principal cities along its route. Considerable success was achieved with the apparatus then available, but the war came along and further development ceased for the time being. On March 22 last, tests were again started with better equipment and the advantage of recent developments in receiving apparatus. The first test made was with a temporary one-wire antenna on a single car, on a short run to Morristown, N. J.

Underwood

Like the Lackawanna the Rock Island R.R. has been testing the train radiophone. View shows a group aboard the Golden State Limited "listening in"

A comprehensive test was made March 26. A buffet car was equipped with three 4½-inch, six-wire cages, one on each side, and one in the center. A 15-watt phone set was installed and a detector two-step amplifier, in conjunction with a regenerative set, was used. This car was placed in the Lackawanna Limited, leaving Hoboken at 10.20 A. M.

Underneath the iron superstructure of the terminal, a few local amateurs were picked up, and one or two radiophones, readable on the loud speaker. After leaving the terminal, there was a great increase in signals, and as the Bergen tunnel in Jersey City was approached, many local amateurs were picked up. Inside the Bergen tunnel, which is 4,283 feet long and 90 feet underground, one or two C.W. stations and several ships were heard distinctly. Upon emerging from the tunnel signal strength increased with a "bang." Going through Newark and the Oranges, various tests on the transmitting set were conducted, and no effort was made to receive. Upon reaching Stroudsburg, Pa., a telegram, delivered to those aboard the train stated that the phone messages had been received several times along the route.

One or two long calls on C.W. were given, followed by calls on voice. When about 10 miles from Scranton, following a long call on voice, 8ARI, on 197 meters, was clearly heard calling by voice, "Hello, 'D.L.' Hello, 'D.L.' Hello, Lackawanna Limited. I am receiving your voice very clearly. Please come in and give your location." The Lackawanna Limited was then coming down the mountains at about 65 miles an hour, through ravines and cuts and through tunnels. There were hills on all sides, and one would suppose it to be a most inauspicious radio location. Communication was then established with 8ARI and conversation was kept up until the Limited had arrived in Scranton. The signal strength of 8ARI in Scranton was such that many people who gathered in the special car could hear everything said. It is to be remembered that only a one-car antenna was being used during this test. While in Scranton 8RH and 8BUW were both worked.

Upon leaving Scranton, bound for New York, a message was sent to the Scranton Times from Mr. Foley, Superintendent of Telegraph and Wireless, of the Lackawanna Railroad, via 8BUW. It was interesting to note that when 8BUW was repeating the message for verification, the Limited passed through a tunnel and the effect in this particular tunnel was hardly noticeable, although it must have been several hundred feet long. Steady two-way phone conversation was carried on until about 12 miles out, when going around a mountain, 8BUW was completely lost and was not picked up until the train had reached a large lake. Going along this lake, there was a marked increase in signals, and the following stations were listed: 8ADQ, 8BUW, 8AOE. From then on the log of the trip was as follows:

Time	Station	Remarks.
5.15	2BRB	Just readable.
5.20	1RX	Fair signals.
5.25	2BK	Strong.
5.35	1RX	Strong.
		The train was now going about 60 miles per hour through the Pocono Mountains, some 30 or 40 miles from Scranton.
5.37	WJZ	Faint.
5.45	1ARY	Loudest station so far.
5.47	2BM	Fair signals.
6.00	1RX	Very strong.
6.15	1CNI	Fair signals.
6.20	1BQL	Fair signals.
6.40	1GM	Very strong.
6.50	2ACY	Strong.
7.05	2AHU	Very strong.
7.10	1ADL(cw)	Strong.
		Now passing over plain, and signal strength much stronger.

Telegrams were received at Stroudsburg that the voice had been heard for twenty miles out from Scranton, and that the position report had been received by C.W. while passing Elmhurst Dam, ten miles away.

The train was now down near Mountain View, N. J. WJZ was very strong and could be heard all over the car. 2IA concert in Jersey City was also of good audibility. Long distance completely blotted out by interference from local amateurs and 2FP. WJZ was held all the way into Hoboken, for the benefit of those who liked the music.

In the way of an experiment, per-

haps the most interesting data gathered was that of the effect of location on signals. Nearly all previous theories seemed to be confirmed, except that of immediate proximity of rock, steel bridges, and bodies of earth. Very little difference could be noted whether the railroad ran through a steep cut, 30 or 40 feet deep or was on the level. Whenever the train went through a thickly wooded piece of land, where the trees were high, all long distance signals faded out entirely. The nearness of a body of water or a stream, even though small, seemed to greatly increase signal strength. The direction of the antenna in regard to the transmitting station was another important factor, for often, going around a curve, on a perfectly level plain, one set of stations would completely fade out and another lot come in.

As mentioned before, small contours in the earth's surface, when they are not wooded, seemed to have little effect, but the location of a mountain immediately between the train and stations in a certain locality would cut out the signals entirely. This was evident very strongly when 8BUW was lost while rounding a mountain, but was picked up again when the train came out higher up on a plain. The best signal strength of all was when passing on a high embankment across a bare plain. This seemed even better than the proximity of a lake. Of course, all these observations are from only two trips, but yet they seemed to hold true in nearly every case.

Mr. G. D. Murray, Jr., and the author, who are in charge of these experiments, will greatly appreciate any report of the signals of "DL," which is the temporary call used by the Limited. All communications should be addressed to the Department of Telephone and Telegraph, Lackawanna Railroad, Hoboken, N. J.

Radio in Mexico

By J. F. J. Maher

Chief Engineer, Cia. Radio Tel. y. Tel. Mexicana, S. A. Juarez, Chih., Mexico

IT is not an exaggeration to say that no country in the world presents as many problems of communication as the United States of Mexico. The Republic covers an area of 768,883 square miles, with long stretches of coast on both the Atlantic and Pacific oceans, and inland immense areas of fertile and desert, tropical and temperate lands run from sea level to altitudes of over eight thousand feet. On the map it lies between 15° 0′ and 32° 30′ north latitude, and 87° 0′ and 117° 0′ west latitude. This takes in every condition of atmosphere imaginable, at least where it concerns radio communication, and there is more than one radio man here firmly convinced that Mexico is the great headquarters of old man Static.

There are now twenty-three radio stations in operation, nine on the coast, and fourteen in the interior. Inasmuch as they are not listed in the call books, it seems advisable to list them here:

Interior Stations:

XDA Chapultepec, D. F.
XDB Saltillo, Coahuila.
XDC Torreon, Coahuila.
XDD Queretaro, QTO.
XDE Chihuahua, Chih.
XDF Guadalajara, Jalisco.
XDG San Luis, Sonora.
XDH Oaxaca, Oax.
XDJ Mexicali, Baja Cal.

Coast Stations:

XAA Vera Cruz, Ver.
XAB Campeche, Cam.
XAC Payo Obispo, Q. R.
XAD Alamos, Sonora.
XAE Mazatlan, Sin.
XAF La Paz, Baja Cal.
XAH Hermosillo, Son.
XAI Tuxpam, Vera Cruz.
XAJ Tampico, Tam.
XAK Acapulco, Guerrero.
XAL Puerto Lobos, Ver.
XAM Merida, Yucatan.
XAN Santa Cruz, Oax.
XAO Isla Maria Madre, Nayarit.

The principal station is at Chapultepec in the outskirts of Mexico City, and is rated at 200 kilowatts for the largest set, and twenty kilowatts, five and two, for the smaller equipments. With the exception of one small tube transmitter, all the apparatus is of the quenched-spark type. However, these will be all supplanted by the more modern and tremendously more efficient continuous wave transmitter, such as is now used by the State Government of Chihuahua, a picture of which is shown. This is a two-kilowatt set of American manufacture, adaptable for either telegraphy or telephony, and charges an umbrella antenna supported by a 240-foot steel tower. The antenna current is normally about twelve amperes using counterpoise. Power is supplied from a ten-kilowatt Westinghouse 60-cycle generator, operating a 2,000-volt motor-generator unit. It has been found necessary to replace the prime mover, a gasoline engine, with a crude-oil Fairbanks machine, due to the instability of the former.

Official radiophone station of the State of Chihuahua

Civilian wireless is becoming quite as much a problem in Mexico as it is elsewhere for the manufacturers, and they will be hard put to take care of the tremendous demand for apparatus. However, the more serious problem is in connecting up some 160 cities and

large towns, not to mention the innumerable villages and isolated industries, now without telephone communication.

Recently I conducted a series of experiments on trains of the national lines to determine the practicability of using radio telephony to supplement the present system of dispatching trains. I have had the pleasure of being present at a number of original experiments in wireless communication of these and former days, but I cannot recall anything that gave quite the same thrill as talking from a Mexican express train going forty miles an hour from the capital to Loredo. We installed a set recently at the Hotel Regis, Mexico City, and the first night everyone wanted a concert from the states. That it was a large order can well be appreciated, but what is a few thousand miles to a good amplifier? Presently we heard music and then it stopped, and a voice said, "Hello — Hello — Hello, this is the broadcasting station of the General Electric Company, Schenectady, New York, this is the last selection of the evening, please write." Well, that was quite a thrill, also. The local papers talked about it for a week, and radio occupied the front page to the exclusion of other news items such as recognition and oil. Any night we hear amateurs, hundreds of them, from New York to San Francisco, some loud as a nearby Klaxon.

I should like to arrange for telephone tests this Fall with those who may be interested.

Emergency Radio Equipment For Airplanes

By G. H. Daly, D. S. M.
Lieutenant R. A. F. Reserve

IT may sound rather absurd to talk about sending an SOS from an airplane when anything goes wrong, but proper consideration of the matter will dispel the absurdity of the idea. It must be remembered that very few people are killed in the air — it is when the aircraft hits the ground that objectionable things happen.

Consider for instance that an airplane is flying through the air and the engine suddenly stops. In nine cases out of ten the pilot will be able to "land" the airplane safely, but if the landing takes place in the sea out of sight of the shore, or in the middle of some desert—and no one knows that the plane has "landed" — the chances of rescue are doubtful, to say the least. On the other hand, if the operator sends out a distress call as soon as the trouble occurs, there is a good chance of the occupants of the aircraft being picked up.

As airplanes are equipped at present it is only possible to send out wireless signals while the aircraft is in full flight. If an air-plane has "landed" on the sea or ground before the operator has had time to send out a distress signal no signal can be sent, and needless to say innumerable cases of hardship and loss of life have occurred in this way. This has been especially the case where marine aircraft is concerned. On one occasion, to quote a well-known example, a seaplane crew which included a wireless man, floated about for four days without food or water just because the wireless set automatically became useless directly the seaplane "landed."

Somewhat similar accidents frequently happen to aviators whose line of flight takes them across the desert. They may suddenly find it necessary to land through engine trouble some hundreds of miles in the heart of the desert, and if it is impossible to get a wireless message sent out before the plane lands, only those who have suffered the torments of sun-blistered skin, tramping over loose sand, and the agonies of thirst and sandstorms, will realize what it means to come down in the heart of the desert.

Last year the French General Laperine set out to fly across the Great Sahara Desert of Africa from Tamaurasset to Timbuctoo. He never reached his destination. Proof has since been established that he was forced to land on the desert and although his machine was fitted with wireless, no signals were received from him probably because there was no time to transmit before the plane landed in the desert, and of course once the plane was on the ground the wireless was useless.

Underwood

"Flying Parson" Maynard, Jeannette Vreeland and Miss Thais Magrane who gave a radio concert from an airplane in flight recently

There are two reasons for the impossibility of wireless transmission once a plane has "landed." First, there's no available primary voltage because the generator for supplying the primary voltage is driven by a small propeller which is driven by the draught of air from the airplane propeller, so that when the airplane lands and the propellers cease to revolve there is no power for the wireless set.

It might be mentioned here that the propeller of the generator is not driven by the draught of air from the main propeller on some aircraft, but is made to revolve by the force with which the aircraft is flying through the air, and in this case also the generator is quite as useless for functioning once the aircraft "lands" as when the former arrangement is used.

Another reason for inoperation of the airplane wireless set from the ground is the trailing aerial generally used on aircraft. This aerial normally hangs down from one hundred to two or three hundred feet below the airplane. It will easily be understood therefore that directly the aircraft "lands" this aerial becomes useless.

So far no practical solution of these problems has been put forward. Some experts have suggested a small gasoline motor to drive the generator, while others are under the impression that an accumulator battery would serve the purpose. Another idea is to use a specially hand-driven generator somewhat similar to those carried in lifeboats. None of these suggestions are of very much value for, among other drawbacks, they entail added weight which results in less cargo and passengers on the aircraft.

The solving of the trailing aerial problem is less difficult, although there are still some intricate points to overcome. Experiments have been carried out with aerials rigidly fixed to the body and wings of the aircraft and although these have so far only proved efficient for reception purposes and transmission over very short distances, there is little doubt that this idea when it ultimately becomes perfected, will solve the aircraft antenna problem.

Experiments with a special type of

collapsible kite carrying an aerial of three hundred feet of seven strand copper wire has given good results. Another idea for the emergency aerial is a collapsible steel mast, built in sections, which can be run up from the body of the aircraft once it has "landed," but this again has the disadvantage of being rather weighty as well as awkward.

Fog and Aircraft Wireless

A striking example of the value of the wireless direction finder to aircraft in fog was given at Croydon, the London terminal aerodrome, on October 21. The inward air mail from Paris was due when a dense fog set in. Communication with the air mail was immediately established by the wireless direction finding stations, and the ground operators were able to assist the pilot of the air mail to find the aerodrome; where a perfect landing was made.

Commenting upon the above incident "Flight," a leading British aircraft paper, and the official organ of the Royal Aero Club, says:

"This incident seems to point the moral that every machine intended for passenger carrying should be equipped with wireless. It seems to be reasonably certain that if this machine had not been so equipped the pilot would, in the exceedingly thick weather which prevailed, have been compelled to make a forced landing, with it may be, untoward consequences. For their own sakes the aerial transport companies should see to this. The value of directional wireless was well established during the war, and there is no reason to think that it will be any less essential in peace flying. As a matter of fact it will have to become a part of the equipment of every mail and passenger aircraft, and much as we dislike a multiplication of regulations we are of the opinion that the sooner it is made compulsory the better. Air navigation must be made safe at all costs, and any practical aid to safety should be adopted sooner rather than later."

Armstrong Patent Sustained

THE appeal of the De Forest Radio Telephone and Telegraph Company against the decision of the United States District Court for Southern New York, which sustained the contention of Edwin H. Armstrong that the De Forest Company had infringed the famous feed-back patent No. 1,113,149, has been denied by the United States Circuit Court of Appeals, for the Second Circuit.

The decision, in part, was as follows:

"The patent in suit was granted for a wireless receiving system on October 6, 1914, and on an application filed October 29, 1913. There are twelve claims in suit. All are held to be infringed by the decree below. The invention relates to improvements in the arrangement and connections of the electrical apparatus and receiving station of a wireless system and particularly a system in which the so-called audion is used as the Hertzian wave detector, the object being to amplify the effect of the received waves upon the current in the telephone or receiving circuit, to increase the loudness and definition of the sounds in the telephone or other receiver, whereby more reliable communication may be established or a greater distance of the transmission becomes possible.

"The patentee, while a student of Columbia University, living in Yonkers, was an amateur wireless operator and had a station at his home. There he made observations which led him to suspect that the radio frequency oscillations might be carried over into the plate circuit with some improvements in the detecting action of the audion. He tuned the plate circuit to radio frequency by inserting in the plate circuit such inductance and capacity as to make it responsive to the radio frequency waves. Then he found not only that the radio frequency waves could be carried over into the plate circuit, but that they could be there amplified by the energy derived from the local battery in the plate circuit without change of frequency or wave form and that they could be fed into the grid circuit where they increased the potential variations on the grid and the operation continuously repeated itself, producing the feed-back regeneration which increased normally the sensitiveness of the device and the loudness of the receiving signals. It was in this way that he thought out his invention which has been a great advance in the wireless art.

"But it is sought to defeat the patentee by the claim of prior date of invention by DeForest and some patents in the prior art are also submitted as defenses.

"The testimony of DeForest has been offered in evidence by which it is attempted to show that he had conceived the invention in 1912 and 1913, and that he is, in point of fact, the prior inventor. The appellant offered in evidence DeForest's experimental note books, showing entries made under date of June 21, 1912, where there is the observation of a beat or high frequency note with a straight audion hook-up. The note shows this to have been transient and incapable of reproduction, and he recognized that it was not the true heterodyne effect. This was due to the gas action in the tube, an effect which has always been observed by users of the straight audion hook-up.

"On February 20, 1915, DeForest published in the "Electrical World" an article in which he made claims with respect to his early work on the oscillating audion and referred to two such experiments, the first of which he said occured in the latter part of 1910 or 1911, and the second on August 26, 1912. In these there is no mention of the feed-back circuit of the Van Etten August 6 entry, which it is now claimed represents his first real discovery of a controllable oscillating audion. These and other circumstances seem to us inconsistent with the idea that DeForest had any real knowledge of or understood the Van Etten accidental circuit arrangement of August 6, 1912. Nowhere in the notes which are in evidence is any reference made to the terms which would ordinarily be used if such a discovery were made and understood. The terms 'feedback' or 'regeneration,' 'input circuit' or 'output circuit' or 're-amplification,' are not found in the notes.

"We do not agree with the claim of the appellant that the patent is for a principle. It is for an instrumentality. It should be construed to cover the uses of the apparatus which are described and claimed. As the testimony of the expert called by the appellee indicates, the appellant's use infringes all of the claims of the patent in suit relied on.

"We think this excellent contribution to the wireless art should be accorded the full scope which the court below gave it in the decree. We think the decree is not too broad, but properly describes what the inventor conceived and for which protection must be accorded to him. Decree affirmed."

Amateurs Assist Associated Press in Emergency

THE snow storm which raged over the Northwest on February 22 and 23 played such havoc with telegraph and telephone lines that the Associated Press news service was badly crippled. According to the Minneapolis Tribune the emergency led that paper to organize its first wireless news service.

"With the aid of the University of Minnesota radio station, and a dozen wireless operators of the Twin Cities," states the Tribune, "The Tribune supplemented its halting wire service with radio bulletins."

When the Associated Press service was completely cut off early in the evening the University wireless station sent out an SOS for news and sought to get in touch with the Associated Press offices in Chicago. Response was prompt and eager. Amateur operators, anxious to help, sent in what news they could find and in a short time after the first call, bulletins had been received from Illinois and Indiana points. By midnight the Tribune had the news flashes from the navy station at Arlington.

At this stage of the game the amateurs of the Twin Cities extended their radio service to include points throughout the Northwest. The Tribune, as it received its bulletins, forwarded them to the Associated Press offices, and the amateurs forwarded the news to stations in the Northwest, which in their turn relayed to stations still further on. It was not only a great night for the amateurs—for they were given plenty of opportunity to work during daylight—but it was a time of emergency when radio came in for a thorough test. And radio did not fail.

EXPERIMENTERS' WORLD

Views of readers on subjects and specific problems they would like to have discussed in this department will be appreciated by the Editor

Modulating the Output of Your C. W. Set

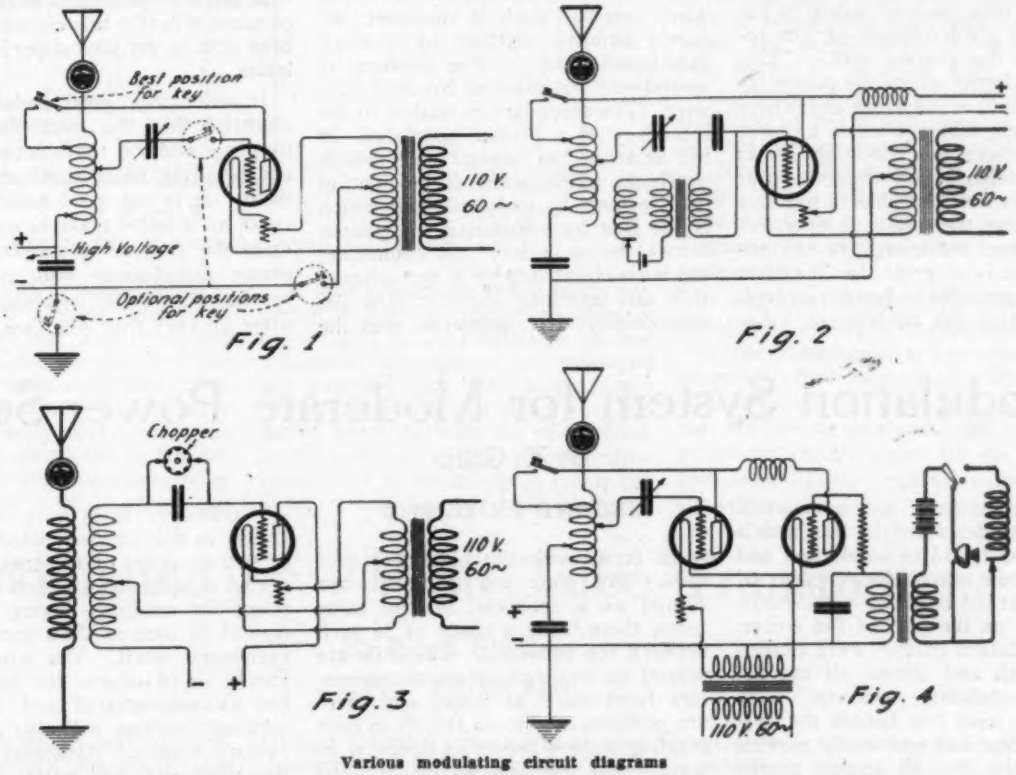
By Clara A. Phillips

FIRST PRIZE $10.00

"ONE — two — three — four — five — Hello! Hello! Hello! How's my modulation now?" That is what one hears almost every evening if they live in a locality that has a few radiophones. Radiophones are winning popularity owing to the ease with which they can be understood, but for a phone station to become popular it is necessary that its modulation be good. Perhaps the average amateur experiences so much difficulty in securing good modulation because there are so many different ways in which to modulate the output of the transmitting station.

It is equally important to get good modulation with key as with voice, for a good note is as desirable as a good voice. The matter is somewhat simplified when modulating with a key as it may be inserted in a variety of places. If A.C. is to be used on the plates of the transmitting tubes, the key may be inserted in the primary lead of the high-voltage transformer, but if the high voltage is to be rectified it is not recommended that this method be used. Satisfactory results are obtained with the key inserted in filament center tap lead or in the grid lead. The key may also be inserted in the ground lead if the power output is not too great, but this is not recommended. The most satisfactory place to modulate the output of the transmitting station is in the inductance. Two or three turns of the inductance are shunted by the key. This method is best where a chopper is not used, as the tube is always oscillating and therefore gives out a smooth note, whereas if the key is placed in the primary lead of the high-voltage transformer the tube must build up each time the key is pressed and does not give a tone that is pleasing to read.

If the amateur wants to make his signals audible at a receiving station which employs a mineral detector some method must be used other than straight C.W. He has two methods, buzzer modulation and chopper, from which to choose. Buzzer modulation is the cheapest and is efficient if the buzzer can give a steady note when the key is elsewhere in the circuit. Figure 2 shows the circuit the writer has selected after trying the chopper and also the buzzer in the grid lead as shown in figure 3. The method shown



Various modulating circuit diagrams

in figure 3 is not very good as it is almost impossible to have the buzzer maintain a constant note when the key is pressed. Figure 4 shows the method in which the chopper is connected in the circuit. This method is considered the best by some, but I found it was too much of a drag on my battery. If the amateur has a small 110-volt A.C. motor, such as dentists use, a chopper may be made by fastening to the armature shaft a fibre or hard rubber disk four inches in diameter in which is set 12 brass or copper studs that are flush with the outside face. An old set of copper wire brushes, such as are used on small starting motors, make excellent brushes for the chopper. The key is connected as shown in the diagram.

If the amateur wishes voice modulation he has a variety of systems to choose from which perhaps is the very reason that he experiences so much trouble in getting good voice modulation. The most simple system is the insertion of a microphone of low resistance in the ground lead. This method is alright where the power input and output is not large and where an amplifying tube is used as a power tube, or where the receiving set is made to oscillate and thus transmit voice. It is not desirable to use this method where the output is over five watts because the energy in the antenna circuit is so great that it causes the carbon granules to become packed, thus distorting the modulation. Another form of this method is to shunt the microphone with a few turns of wire to act as a by-pass for some of the radiated energy. Still another method is known as the "Absorption Method." In this method the microphone absorbs part of the radiated energy and modulates it with voice. This is accomplished by making a single turn of heavy insulated wire around the inductance and connecting the microphone directly across the ends of the loop. These three methods are not very satisfactory as the energy lost in absorption is too great to insure efficient results.

By far the best method to use for voice modulation is the method which employs a modulation transformer, those put out by the various manufacturers being fine for this work. If the amateur desires to build his own modulation transformer, however, the following will give good results. The core is made up of Norway soft iron wires, one-half inch in diameter, securely bundled together by a small card-board tube. The primary is wound with 265 turns of No. 26 S.C.C. wire. The secondary is similar to the secondary of a ¼-inch spark-coil. If the amateur has several coils which he thinks might work as modulation transformers he can easily tell which is the best by connecting the phones across the secondary and connecting the microphone battery in the primary side and speaking directly into the microphone. It is important that the microphone be spoken directly into when modulating the voice over the air. The coil that gives the best modulation as determined by the clearness of the articulation and signal strength is the one to use. It might increase the radiation of the set by shunting a condenser across the terminals of the spark-coil modulation transformer but the modulation does not change.

The location of the modulation transformer depends upon the circuit employed. With tubes used as oscillators the best place for the modulation transformer is in the grid lead, though satisfactory results are obtained with it in the filament center tap lead. If one or more tubes are used as modulating tubes the transformer must be in the grid lead of the modulating tubes. While it is possible to modulate three or four tubes used as oscillators by one modulating tube, it is recommended that every oscillating tube have a companion modulator. I personally prefer this circuit as I have been able to get almost perfect modulation.

In order to get good modulation it is essential that the microphone work properly and too much attention cannot be given to this valuable instrument. It is not good policy to purchase an inferior make in order to reduce the cost as a standard microphone transformer will give better service and better modulation. And after all isn't that what we all want?

Modulation System for Moderate Power Sets

By K. Gitlitz

SECOND PRIZE $5.00

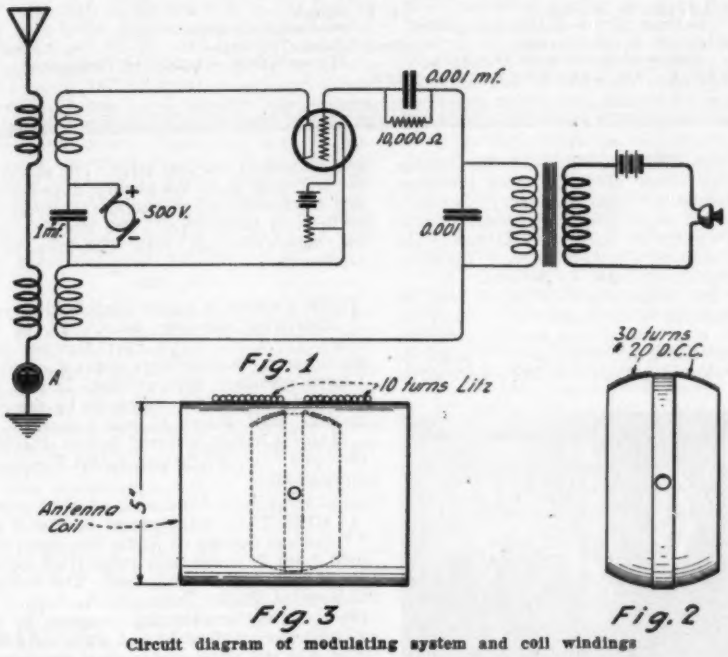
THE transmitter and modulation system described in this article will be found to be efficient and practical from an operative point of view, as it is the result of considerable experiment on the part of the writer. Many oscillation circuits were experimented with and almost all the accepted modulation systems were thoroughly tried out before the system here presented was finally selected as giving the best all around results on sets ranging in power from 5 watts to 25 watts. It is well known, for example, that some modulation systems which are satisfactory for low powers will not prove efficient on medium or high powers. This was specifically avoided, as I hoped to increase the power of the transmitter, and therefore wanted a modulator which could be adapted to all powers without much change.

Figure 1 shows the connections and circuit of the transmitter. The oscillation circuit is the series feed circuit in which the plate generator is directly in series with the plate and grid coils. The plate and grid coils are wound as a split coil on the same form, there being a space of ¼ inch between the two coils. The coils are wound on a 3-inch spherical variometer form made of wood, and there are 30 turns of No. 20 D.C.C. in each winding section shown in figure 2. In series with the two sections of the plate grid coil is connected a one micofarad telephone condenser which shunts the plate generator, thereby providing a by-pass for the radio-frequency current and so affording protection for the generator windings. The other end of the two coil sections go to the plate directly and to the grid through the grid condenser and leak. The grid condenser is .001 mfd. and the grid leak is 10,000 ohms; these values having been found to give best average results between the powers of 5 and 25 watts.

The plate and grid coils are coupled in variometer fashion to the output circuit in the antenna, which consists of two windings of 10 turns each connected in series on a 5-inch cylindrical tube; the windings having a separation of ¼ inch to allow space for the variometer shaft. The winding tube should be of dilecto for best results, but an impregnated and well-baked cardboard tubing will also give satisfactory results. Amateurs will find that unusually good results will be obtained if heavy litzendraht, which can be obtained at any radio store, is employed for the antenna coil. This coil is tapped at every three turns, allowing sufficiently fine adjustment for wavelength control. The coupling is adjusted by rotating the plate and grid coils. In tapping the litzendraht care should be taken that all the strands are carefully separated, the enamel scraped off well and all strands properly tinned, otherwise, a high resistance may be developed. Also when soldering no traces should be left on the tube or the panel, for otherwise

leakage paths will develop and diminished output will result.

It was mentioned in a previous paragraph that various modulation systems were experimented with. The microphone was used in the antenna but unfavorable results were obtained when powers in excess of 10 watts had to be modulated. The Heising system of plate modulation was also tried, and this gave excellent results, but this circuit required extra modulator tubes, some accessories like radio frequency and audio-frequency choke coils, etc. It was therefore abandoned as I wanted to use all my tubes as power tubes and eliminate all possible accessories which might be dispensed with. The simple modulation of grid injection was tried and experimented with until with proper modifications in design good results were obtained over the power range mentioned at the start.



Circuit diagram of modulating system and coil windings

In this circuit the audio-frequency speech voltage is impressed directly on the grid of the oscillator. A low resistance microphone is employed and supplied with D.C. power from two or three dry cells in series. Connected in series with the microphone is the primary of the speech transformer. The secondary is connected in series with the grid oscillation coil, and is shunted by a .001 mfd. condenser to by-pass the radio frequency. Note well, that a condenser much higher in value should not be used to shunt the secondary, for it will have a low impedance to speech current and thus short circuit any speech voltage which may be developed across the secondary, and no modulation will be obtained.

Now the most important feature in the modulation system here described is the design of the speech transformer. If this is not properly designed poor and incomplete modulation will result. A Ford spark coil will give good results, but a transformer based on proper values for the primary inductance will give better results. This transformer has a ratio of 30 to 1. The core is made either of a bundle of iron wires having a diameter of ⅜ inch, or of sheet transformer iron stacked up to give a cross-section of ⅜ x ⅜ inch. The core is bound with linen tape or stiff paper and wound with 300 turns of No. 18 S.C.C. in about four layers. The primary is then bound with one thickness of heavy stiff paper such as oak tag, and wound with 9,000 turns of No. 30 enamel wire in about 28 layers. This will give sufficient secondary voltage to modulate the radio frequency output of the oscillator completely.

It will be seen that the circuits are simple and relatively inexpensive and that the modulation system requires extremely little apparatus. The results obtained will show that this circuit delivers the goods and will recompense the experimenter for the little trouble and labor involved in its construction.

Modulating Five-Watt Tube Transmitters

By Floyd Rittman

THIRD PRIZE $3.00

THERE are several ways to modulate the output of a 5-watt tube. Some are only slightly efficient, and can be used only when the current radiated is low. One way is to insert a telephone in the ground circuit of a transmitter. This will modulate the output only when a small amount of current is radiated, and even then the entire output of the transmitter is not modulated. The microphone must be especially constructed to carry a heavy current or it will pack after it has been in use only a short time.

Another method of modulation is that known as the absorption loop method, in which a few turns of wire, shunted by a telephone transmitter, is slipped over the inductance. When the telephone is spoken into the amount of current absorbed by the few turns of wire varies, thus impressing the speech upon the output of the transmitting set. The few turns of wire may be slipped back and forth upon the inductance until the point is found where the modulation is the best. This type of modulation is better than the one explained before, but like the former method, it can be used only on transmitting sets where the output is small. One thing to recommend it is the fact that it requires only a few turns of wire and a telephone transmitter.

In order to use the modulation loop on the set which I described in the February WIRELESS AGE, a change must be made in the inductance. One of the end supports must have a hole as near in size to the inside diameter of the inductance tube as possible. A piece of tubing large enough to slide through this hole loosely, is wound with a few turns of wire. The number of turns which works best must be determined by experiment. This tube is put inside the inductance, and the amount of current it will absorb

(Continued on page 68)

The Monthly Service Bulletin of the

NATIONAL AMATEUR WIRELESS ASSOCIATION

Guglielmo Marconi, *President* — J. Andrew White, *Acting President* — H. L. Welker, *Secretary*

Founded to promote the best interest of radio communication among wireless amateurs in America

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HEADQUARTERS: 326 BROADWAY, NEW YORK

THE New Haven Radio Association held a very successful meeting March 30, in the new permanent quarters of the club in Fraternal Hall, 19 Elm street. The occasion was the regular semi-monthly meeting of the club and the attendance was large despite the bad weather.

It was announced that the membership had grown to 126 and that probably by May the 200 mark will be reached. The club will continue its activities through the summer so that the new members may be instructed in wireless to the effect that next winter the more advanced details of radio transmission may be grasped.

△ △

MARKED progress is being made at Mount Vernon, N. Y., in the organizing of a local radio organization, to be known as the Mount Vernon radio club, as a result of a meeting at the Y. M. C. A. In addition to the club to be open to all people in the city who are interested in radio, it is probable that there will be formed an organization for licensed amateurs and recognized radio students.

The latter organization will be made up of possibly thirty local exponents of radio who have spent several years in study and experiment and, judging from statements of several of the men who are interested in this latter organization one of its most important functions will be to assist the Mount Vernon Radio Club.

The members of the amateur club will probably offer to take part in discussions, offer papers and give any advise requested by members of the club regarding construction of receiving sets, tuning devices and the most advantageous manner of manipulating them.

The Mount Vernon Radio Club in the meantime will continue and will hold meetings at intervals. Efforts are being made to make arrangements for the securing of a receiving set by the club, when it is properly organized and with the assistance of the Amateur club, the first organization should be successful.

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AMATEURS and others interested in radio development are invited to attend the regular Friday night meetings of the San Francisco Radio Club at its headquarters, 173 Dolores street, San Francisco. The club invites visitors to its meetings with the exception of that held the first Friday in the month, when the session is devoted to club business.

The San Francisco Radio Club is the oldest of its kind in this part of the country, having been organized ten years ago. At 173 Dolores street it maintains large quarters, equipped with receiving and transmitting apparatus. Lectures and demonstrations are given, and the membership includes all grades from the beginner to the seasoned commercial radio operator.

At the head of the club are experienced radio men. The president is H. W. Dickow, managing editor of Radio; vice president, C. Thompson, radio engineer; secretary, Sidney J. Foss, a commercial operator who was in charge of radio stations during the war; treasurer, A Shoemaker, operator, and sergeant-at-arms, A. Burgess.

The San Francisco Radio Club was the first organization to suggest and foster the "Pacific plan," which has been a great help in broadcasting on this coast. Through its information department it has succeeded in

Admiral Sir Henry B. Jackson presenting to W. E. Burne the first prize for English reception of American amateur trans-Atlantic radio messages

putting a stop to transmitting by amateurs during concerts. Through its service the club "keeps the air clear" in this district, and amateurs who violate the rules are promptly reported.

Secretary Foss was for some time the youngest radio operator in the country. He started when he was 15 to learn the mysteries of radio, and still is an enthusiast.

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THE officials of Richmond, Va., have adopted a set of rules covering the installation of amateur wireless stations, which provides that such installations must conform to the provisions of the National Electric Code.

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FINLEY DAVIS, West Second street, was elected president, Paul Scrimsher, Locust avenue, vice-president, and William Gess, East High street, secretary-treasurer of the Junior High School Radio Club, Lexington, Ky., at the organization meeting held March 29 at the school.

The club is composed of Junior high boys and alumni of the past term. The object of the club is to study the history, development and mechanism of the radio. Meetings are to be held bi-monthly. The club is under the supervision of Mrs. Charlotte Scott Dunkman.

△ △

THE Peninsula Radio Club held a very interesting meeting, March 19, in the army Y. M. C. A. at Fort Monroe, Va., when several matters were under discussion. Eleven members were present. It was announced that the demonstration by the club at Elks' Hall, March 16, was a success.

Major Coalton lectured before the club on April 1 on "Radio and Audio Frequency Amplification."

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A MEETING of the junior section of the Indiana Society of Radio Engineers was held April 29 in the Shortridge High School study hall, Indianapolis, Ind. The Indiana Society of Radio Engineers has approved the tentative broadcasting program of the Washington conference and plans were discussed at the meeting regarding the formation of an interference committee in Indianapolis which will deal with local interference problems, both amateur and commerical.

△ △

A NOVEL feature of the big radio show to be held in the Seventy-first Regiment Armory, New York, from May 22 to May 29, inclusive, will be an exchange booth, where the radio amateur may trade his extra equipment with his brother fans. Plans which have just been completed for the show call for the active co-operation of the Signal Corps battalion which is located in the tower of the armory, and much Government material will be exhibited.

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ADVICES have been received from Pierre Corrot of Paris, editor of a leading French wireless magazine, that French amateur stations have recently heard messages from 1ARY, the University of Vermont station at Burlington, Vt.

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FORTY members of the Reading Radio Club of Reading, Pa., gathered at Sterling Lodge in Hill Crest on March 10, to celebrate the first anniversary of the club. A banquet, addresses and entertainment featured the evening.

Harold Landis, president of the club, presided at the banquet. On the speakers list were H. W. Rentschler and Edwin F. Deem, secretary of the P. & R. Y. M. C. A. The speakers reviewed the progress made by the club during the year and predicted that the next year will witness a phenomenal increase in its popularity.

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THE Norfolk, Va., Radio Club, which met on March 29, authorized the appointment of a committee to take charge of the organization's work. Those who want information

about radio, or who need assistance in getting started have been asked to get in touch with the secretary of the club, 222 Brewer street.

The problem of interference of local radio operators with concerts from the north also was taken up, and steps will be taken to attempt to minimize that interference.

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CIVIL Service examinations for junior physicists to fill vacancies in the Bureau of Standards, Department of Commerce, Washington, D. C., will be held on July 5 and August 25, next. Intending applicants may secure full information and application blanks of the Civil Service Commission, Washington, D. C., or any local branch of the Commission. Applicants may be examined, at their request, on any of the following subjects: Radio, heat, electricity, mechanics, optics and physical metallurgy. The salaries of the positions to be filled range between $1,200 and $1,500 a year, with an additional bonus of $240 a year.

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SIXTY-EIGHT amateur operators met on March 9 at the Hotel Muehlebach, Kansas City, Mo., to organize the Radio Club of Greater Kansas City. Their first purpose is to appoint a regulator for amateur traffic and to establish a means of penalizing operators who cut in on concerts given at fixed intervals, by petitioning for a revocation of sending licenses.

The organization will be completed and officers will be chosen at a meeting to be held at the Hotel Muehlebach.

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AMONG the activities of the Roselle Park Radio Club, of Roselle Park, N. J., was a lecture by Paul F. Godley, which included a description of his experiences in Scotland and also the apparatus used in the tests.

On March 23, E. W. Tingley gave an interesting talk on "Amplifying Transformers and Condensers."

On February 24 last the club held a dance, the music for which was furnished entirely by radio from WJZ station.

The club is growing both in membership and activities. It was organized in October, 1920, with 15 members. The present membership is 72. The club will, in future, issue advance printed programs of its activities. Copies may be obtained from the secretary, C. A. Reberger, Roselle Park, N. J.

The lecture by Paul Godley was given in the High School Auditorium, Grant avenue, Roselle Park, at 8 P. M., Tuesday, May 9. An Invitation was extended to all interested to attend this talk by Godley.

The officers of the Roselle Park Radio Club are: R. H. Horning, president, 2KK; G. Bosler, vice-president; C. A. Reberger, secretary; H. Ryder, treasurer; H. Luttgens, traffic manager, 2BCC; P. J. Larsen, technical adviser.

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Abreast Of The Times

By R. R. COATES

A GREAT many of the amateur radio enthusiasts of today do not readily sense the value, the absolute necessity in fact, of keeping in close touch with their hobby.

They visit the establishment of their respective dealers, make their purchases or inspect the various paraphernalia which make up the "wireless set" and go home satisfied that they have the best, or that they are familiar with the latest and best in the line. They purchase a copy of some radio periodical or magazine, read a few timely paragraphs and go to bed.

Little do they realize that every tiny "ad" or full page display has something of interest or some knowledge to impart to them. This is quite true. Every day brings something new into this vast new field. To have or to know the best and latest the amateur of today must be "up on his toes."

Not an issue of the various magazines devoted to radio should be missed. Not an advertisement within its covers should be overlooked. The various advertisers are quite glad to forward descriptive matter pertaining to their wares and explaining their respective merits; many of these containing the latest developments of the industry. It pays to write the advertisers. The open forums where hundreds of amateurs all over the country meet and tell of their experience and discoveries is another knowledge mart of exceptional value. A filing of these clippings and pages will be found one of the most valuable assets.

Radio holds a wonderful future, and—to those who wish to specialize—remunerative returns. One cannot afford to miss a single fact or detail. Read, experiment, study the discoveries of others, experiment and improve upon them, broadcast your findings; prove the arguments of others and you will soon find that you are improving at a tremendous rate.

The amateur who has constantly about him every obtainable book, catalog, clipping, folder or other descriptive matter devoted or pertaining to his hobby will be found the better versed and in consequence the most successful.

△ △

Radio BE-3
Third Signal Company
Camp Lewis, Wash.
April 2, 1922.

Editor, "Wireless Age,"

Dear Sir: I have read the N. A. W. A. item on page 42 of the March, 1922, issue of "THE WIRELESS AGE" concerning the reception of Dr. A. F. Banks' 15-watt C. W. transmitter at San Diego, by Mr. Dow, Wailuku, T. H.

I believe we can go Dr. Banks one better, as Mr. Dow reports signals QSA from this station, ex-SC-3. He did not mention the date, however, so have written him for further particulars.

We have been using a Signal Corps SCR-67-A phone set with one extra 5-watt oscillator, making a total of three VT-2's, with a key in the modulating circuit for plain C. W. work. We have a seven-wire antenna 75-feet long and 40 feet high of the inverted "L" type. Transmitting wavelength, 350 meters. Radiation, 1 to 1.6 amperes.

SHELBY J. BLONG,
Staff Sergt., Sig. Corps, in charge Radio BE3

△ △

AT the first meeting following incorporation of the Executive Radio Council, Second District, which was held at the Radio Institute of America, 326 Broadway, on April 11, J. O. Smith declined another term as Chairman and was succeeded by R. H. McMann, who has been Vice-Chairman. The other officers elected are: Vice-Chairman A. A. Hebert; Corresponding Secretary, R. Hertzberg; Recording Secretary, B. B. Jackson; Treasurer, Joseph Stantley; Traffic Supervisor, F. B. Ostman.

Other business transacted included the adoption of bylaws and a final report of the convention committee, which showed that the net proceeds of the recent convention and exhibition were approximately $5,200. It was decided to hold the next annual convention and exhibition during the first week of March, 1923.

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Prize Contest Announcement

The subject for the new prize contest of our year-round series is:

BROADCASTING RECEIVER FOR LOOP ANTENNA

CLOSING DATE :: :: JUNE 1, 1922

Contestants are requested to submit articles at the earliest practical date.

Prize winning articles will appear in the August, 1922 issue.

All manuscripts should be addressed to the CONTEST EDITOR OF THE WIRELESS AGE.

The increasing popularity of Radio Frequency Amplification is bringing constant demands for a receiving set employing a loop aerial which can be set up entirely indoors. Complete constructional details and wiring diagrams of this set will interest many of our readers. Radio Frequency Amplification is comparatively new so bring out all the little hints on this subject.

PRIZE CONTEST CONDITIONS—Manuscripts on the subject announced above are judged by the Editors of THE WIRELESS AGE from the viewpoint of the ingeniousness of the idea presented, its practicability and general utility, originality and clearness in description. Literary ability is not needed, but neatness in manuscript and drawing is taken into account. Finished drawings are not required, sketches will do. Contest is open to everybody. The closing date is given in the above announcement. THE WIRELESS AGE will award the following prizes: First Prize, $10.00; Second Prize, $5.00; Third Prize, $3.00, *in addition to the regular space rate paid for technical articles.*

THE Woman's Radio League, of which Miss Abby P. Morrison is president, took an active part in radio affairs at the recent Travel Show in New York City.

The young women of the league set up a station and erected an antenna, all by 'emselves, and copied signals and messages from many stations in the eastern part of the country.

Miss Marianne Clayton Brown and Mrs. Eleanor G. Regan, both of whom are licensed operators, took down messages from distant points like professional operators for more than one hour.

Δ Δ

IN spite of the inclement weather the S. M. U. Radio Club of Dallas, Tex., held its first meeting March 29. A number of interested students were present in spite of the rainy weather. A receiving set, owned by Carl Feickert and Joe Terrell, was used to give an exhibition. The aerial was only a temporary construction and was not well insulated and the static constantly interfered, but the News and Journal bulletins were received.

The club decided to have a meeting each Wednesday night, and Mr. Feickert, president of the club, said that at the next meeting a crystal set would be brought and a special lecture would be given for the benefit of those not thoroughly versed in radio technique.

The set that was used by the club on March 29 picked up Denver, but due to the heavy static nothing could be heard for any sustained period.

Δ Δ

THE wireless telephone at the Shields High School laboratory at Seymour, Ind., was used for receiving the scores of the basketball games played on March 17 at Indianapolis in the state high school basketball tournament finals.

Mr. C. H. Phillips, instructor in physics and mathematics, has been using the outfit at the school building for some time. A musical program was put on at Indianapolis preceding the games and was heard by the entire class. Following this, the reports of the games were received.

Arthur Kaufman, one of the students, was selected to assist in the work of receiving the messages. The apparatus worked very satisfactorily and the use of the radio phone was both instructive and interesting to the students.

Δ Δ

THE Philadelphia Amateur Radio Association held its bi-monthly meeting on April 3 in the Free Library Building, Broad street and Girard avenue, and heard the latest kinks in radio telephony and telegraphy.

The first speaker of the evening was W. C. MacFarland, employed in the daytime at the radio laboratory at the Philadelphia Navy Yard, who explained the difference between radio-frequency and audio-frequency.

The officers of the Philadelphia Amateur Radio Association are Gordon M. Christine, M. D., 3BF, president; John E. Delp, Jr., 3FD, vice president; W. Bradley Martin, 3QV, secretary-treasurer, and J. W. Forsyth, 3AWC, corresponding secretary. The business address of the association is 1927 North Twentieth street.

Δ Δ

STUDENTS of the Central High Industrial School, 17th and Wood streets, Philadelphia, Pa., have formed a radio club which is one of the best equipped in the city.

The club is encouraged in its work by Professor Ralph P. Earle, head of the electrical construction department of the school. Robert G. Swift, 254 S. 9th street, is president of the club; Edmund Schell, 15th and Vine streets, vice-president, and Richard Wilson, 1702 Race street, secretary. The club was organized a year ago and now has thirty members.

Δ Δ

WOULD-BE amateur wireless operators are declared to be responsible for thefts of receivers from public pay station telephone booths, in many cities of the East.

Reports of such thefts are being constantly received by the telephone companies.

Frequently, when out-of-order reports are received repair men sent to remedy the trouble find the phone minus the receiver, the wire attaching it to the instrument having been cut off.

The amateur operator who thinks, however, that he will be able to use successfully a pay station receiver in catching aerial messages will find himself mistaken.

The regular wireless receiver is wound to 1000-3000 ohms resistance, whereas the telephone booth receiver—the ordinary attachment on telephones, is wound to 75 ohms resistance. It is thus easy to understand how valueless a telephone receiver would be to an amateur wireless operator.

Filching of receivers from telephone instruments has become so extensive in Paris and other French cities that the French authorities have sent out a general alarm by circular warning station telephone operators to be on the lookout against this form of theft.

Modulating Five-Watt Tube Transmitters

(Continued from page 65)

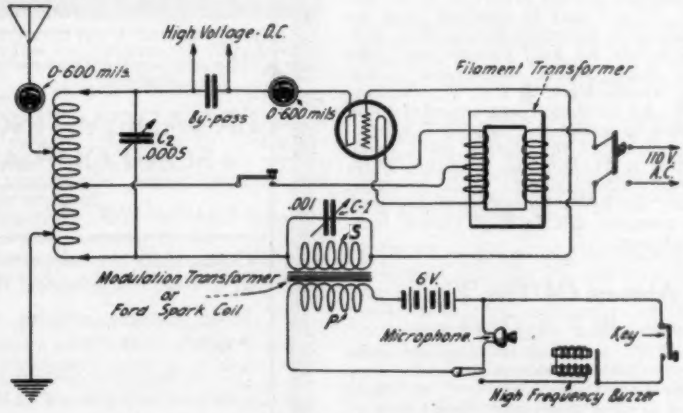
regulated by sliding it back and forth. The modulation depends on the amount of current absorbed.

The best modulation of the output of a small phone set is obtained by using a modulation transformer in the grid circuit of the vacuum tube, as illustrated in the diagram. The secondary of the modulation transformer is connected between the grid of the tube and the grid tap on the inductance. A variable condenser of .001 mfd., is shunted across the secondary to help in tuning the modulation. This condenser is the main adjustment for modulation. A telephone transmitter and a six-volt battery are put in series with the primary of the modulation transformer.

To tune the transmitter for phone when using this type of modulation, set the condenser which is shunted across the modulation transformer (C-1) at full capacity; tune the transmitting set for best radiation on the wavelength desired; turn the condenser C-1 slowly to decrease its capacity. You will notice that the radiation will drop slowly at first, but soon a point will be reached where the radiation drops off abruptly. At a point just preceding this abrupt drop a point will be found where the modulation is the best. The extent to which the outgoing current is modulated may be determined by listening in on the receiving set while tuning for modulation. The phone should be heard plainly in the receivers.

The radiation of the set on phone will not be as great as the radiation on straight C.W. To obviate retuning the set when phone is desired a single-pole single-throw knife switch across the secondary of the modulation transformer will short the secondary when C.W. is to be used.

Buzzer modulation may be used by substituting a buzzer for the telephone transmitter with a key and battery in series.



Connections for modulating a five-watt tube transmitter

STATIONS WORKED AND HEARD

Stations worked should be enclosed in brackets. All monthly lists of distant stations worked and heard which are received by the 10th of each month will be published in the next month's issue. For example, lists received by November 10th will be published in the December issue. Spark and C. W. stations should be arranged in separate groups.

2BDX, R. BERNHARD, 135 Central Park West, New York City (February)

CW—1ff, 1in, 1iz, 1rd, 1uj, 1ze, 1awq, 1aqe, 1awb, 1auj, 1awl, 1ary, 1bqe, 1bti, 1bua, 1bkq, 1bdc, 1bdq, 1cik, 1cac, 1cod, (spk) 1aul, 3bp, 3bz, 3fo, 3fr, 3hg, 3hj, 3nb, 3rf, 3xm, 3zo, 3ajd, 3alm, 3aqh, 3aqw, 3aqr, 3agh,3awg, 3apq, 3alu, 3aay, 3aff, 3bhl, 3blf, 3zab, (spk) 3pb, 4bg, 4dc, 4id, 4gu, 5an, 5fv, 8ao, 8bd, 8bb, 8bk, 8ci, 8dr, 8gl, 8gv, 8kr, 8lw, 8ok, 8os, 8pr, 8px, 8qy, 8sp, 8xv, 8awp, 8aqn, 8anz, 8aim, 8adg, 8awy, 8azh, 8alv, 8aoa, 8avo, 8anr, 8anw, 8awm, 8axc, 8alb, 8aoo, 8bun, 8bae, 8bne, 8bdu, 8bld, 8bnj, 8box, 8bil, 8bxh, 8bno. 8bbu, 8bbk, 8biz, 8bum, 8bnj, 8bny, 8bdu, 8cgx, 8cqm, 8kaz, (additional(8uk, 8bdu, 8cgx, 8cqm, 8kaz, 8uk, 8ym, 8se, 8wy, 8cfp, 9dp, 9dx, 9io, 9ou, 9kp, 9alo, 9aiv, 9aay, 9brl, 9iiv, wdy, wjz, kdka, nzo, dr.

Spark—8acf, 8agz, 8akg, 8afg, 8apb, 8adn, 8ceh, 8ixq.

2BYA, BURTON T. VAIL, 172 Loraine Ave., Schenectady, N. Y. (March)

Spark—1aa, 1adl, 1aje, 1apx, 1ary, 1av, 1aw, 1avr, 1bfz, 1bjs, 1brq, 1bwl, 1cok, 1dz, 1fr, 1gm, 1lz, 1ru, 1rv, 1sm, 1sw, 1wq, 2abm, 2aje, 2anm, 2awf, 2bk, 2blw, 2bm, 2byg, 2chw, 2cie, 2el, 2gx, 2om, 2pv, 2rm, 2sz, 2ts, 3abb, 3ajd, 3arm, 3arn, 3fb,, 3fd, 3hj, 3ok, 3qw, 3ud, 3ux, 3vw, 3xm, 3zo, 4bx, 4ea, 8aav, 8acf, 8afa, 8afb, 8afg, 8ahh, 8ahs, 8aiw, 8apb, 8ark, 8axo, 8bco, 8baz, 8cx, 8ew, 8od, 8sp, 8xe, 9ox, 9uh, 9zj.

CW—1adl, 1afv, 1ajf, 1ajp, 1amq, 1apj, 1ark, 1ary, 1avr, 1asf, 1azw, 1bas, 1bcf, 1bdc, 1bea, 1bep, 1bgf, 1bkr, 1bkq, 1ble, 1brq, 1bqe, 1sd, 1bsg, 1bua, 1bwj, 1cak, 1can, 1cgg, 1cgs, 1cik, 1cit, 1cjh, 1cjz, 1cln, 1cod, 1cpq, 1fb, 1ii, 1on, 1qp, 1pt, 1rd, 1rh, 1rr, 1ts, 1uj, 1un, 1xae fone, 1xm, 1ze, 2aab, 2abq, 2adp, 2agd, 2agv, 2aar, 2adv, 2ajf, 2ajr, 2ako, 2arz, 2auu, 2awj, 2awl, 2aws, 2azz, 2ba, 2bak, 2bcf, 2bea, 2beh, 2bem, 2bg, 2bgz, 2bml, 2bnd, 2bnz, 2bqi, 2bqw, 2brb, 2brc 2btj, 2ccd, 2ccu, 2cfm, 2cgq, 2czs, 2fz, 2ig, 2jj, 2lp, 2of, 2pz, 2rd, 2rp, 2sq, 2va, 2xi fone, 2xj fone, 2vh, 2zk, 2zo, 2zs, 3aad, 3aag, 3aay, 3adt, 3ady, 3aig, 3ajd, 3aln, 3anq, 3any, 3apd, 3ark, 3aqh, 3aqr, 3as, 3azo, 3bag, 3bec, 3bfq, 3bhl, 3biy, 3bg, 3bnu, 3bp, 3brw, 3bof, 3btk, 3bul, 3bur, 3by, 3bz, 3ca, 3cc, 3cg, 3ctz, 3dm, 3fb, 3fr, 3fs, 3gn, 3hb, 3hd, 3hx, 3il, 3iz, 3lh, 3lr, 3rc, 3qz, 3sm, 3ty, 3vw, 3zo,3zw,3zy,4bf,4byq,4by, 4cc, 4dc, 4ds, 4eh, 4ft, 4gl, 4gx, 4id, 4ii, 4lp, 4xd, 5an, 5bn, 5fv, 5kp, 5nz, 5uu, 5za, 8acf, 8ago, 8agz, 8aim, 8anj, 8amm, 8aoa, 8aqf, 8aqv, 8aqz, 8aoo, 8ard, 8aru, 8awm, 8awp, 8awz, 8ax, 8axc, 8axk, 8baz, 8bd, 8bdk, 8bdu, 8bcl, 8bds, 8bef, 8bfx, 8bil, 8blt, 8bnj, 8box, 8brc, 8brl, 8bu, 8bur, 8bvk, 8bss, 8bxa, 8by, 8bz, 8bza, 8bzc, 8bzh, 8caz, 8cbj, 8cgy, 8ckm, 8cko, 8cns, 8dv, 8ge, 8ib, 8iq, 8jl, 8js, 8ju, 8lw, 8os, 8pc, 8rz, 8qd, 8sp, 8tb, 8tf, 8uk, 8vq, 8vy, 8pt, 8wr, 8xv, 8ze, 9aap, 9aau, 9aay, 9akd, 9anc, 9anf, 9apb, 9ark, 9ass, 9blo, 9brl, 9bsg, 9dyn, 9io, 9kp, 9lq, Can. 9al.

3AP, J. MARTIN SIMONS, 2316 N. 19th St., Philadelphia, Pa. (February)

3bll, (3awn), 3ann, 3po, 3jh, 3ob, 3bum, 3dis, (3hj), (3bp), 3bg, 3zq, 3anj, 3any, 3bdm, 3aeq, 3ajk, 3abo, 3bfu, 3bdi, 3bj, 3nw, 3gf, (3ud), 3za, 3bzi, 3gf, 3bo, 3bk, 3qn, 3li, 3aqr, 3bhw, 3azh, 3ahk, (3us), 3em, 3cg, 3iw, (3rw), (3amw), (3asy), 3uo, 3fr, 3la, 3asc, (3als), (3iz), 4dg, (4ea), 4ga, 4eu, 4bn, 4et, 4gl.

1btf, 1byf, 1bro, (1pe), 1afv, 1gm, 1ru, 1azk, 1md, 1aw, 1hk, 1qa, 1bvb, 1asf, 2awl, 2aak, 2ayz, 2dk, 2dn, 2ts, 5xa, 5kd, 5kj, 8go,

(Continued on page 72)

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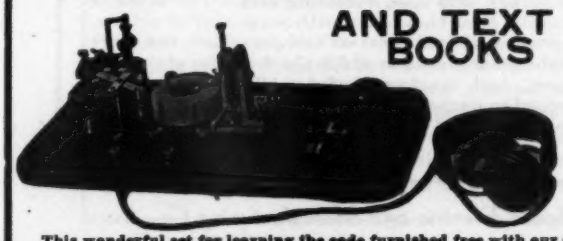

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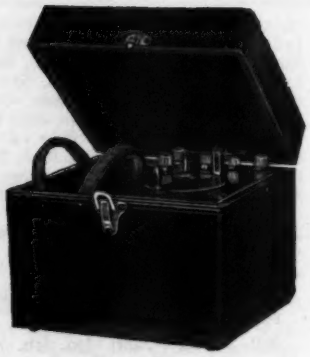

The Aeriola Jr.

The quickest, easiest way of learning radio reception—both telephony and telegraphy—is by means of the Aeriola Jr. Once installed, only two adjustments are required. The set is complete in itself and includes a variable tuner, a fixed condenser, a super-sensitive crystal detector and head-telephones, and antenna outfit. Full instructions for installing and operating are provided. The Aeriola Jr. is good for receiving broadcasted signals, music, speeches, etc. from nearby stations. It can be tuned within a range of 190 to 500 meters wavelength. Price $32.50.

The Aeriola Sr.

Like the Aeriola Jr. the Aeriola Sr. is designed to meet the requirements of novices and beginners who have no technical knowledge of radio, but who wish to "listen in" and enjoy broadcasted music, sporting news, speeches, etc. It has a longer range than Aeriola Jr. It has features found only in more expensive apparatus, such as the Armstrong regenerative circuit to increase the strength of reception, and a vacuum tube detector. The set includes also a pair of head-telephones, a filament and a plate dry battery, and antenna outfit. Full instructions for installing and operating are sent with the set. Price $75.

As from a Phonograph

The whole family can now listen to broadcasted concerts, news, sermons and lectures with the Vocarola. The music and the words come out of a horn, just as they do from a phonograph. Any member of the family can operate it. The Vocarola consists simply of a horn which is mounted on the wall or any other suitable place and which contains a special, loud-speaking receiver unit capable of reproducing music and speech without distortion. It is connected, in the regular manner, with the amplifier of the radio set by means of a cord, which has only to be plugged in. Price $30.

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The above Apparatus is made by the Westinghouse Electric and Manufacturing Co.

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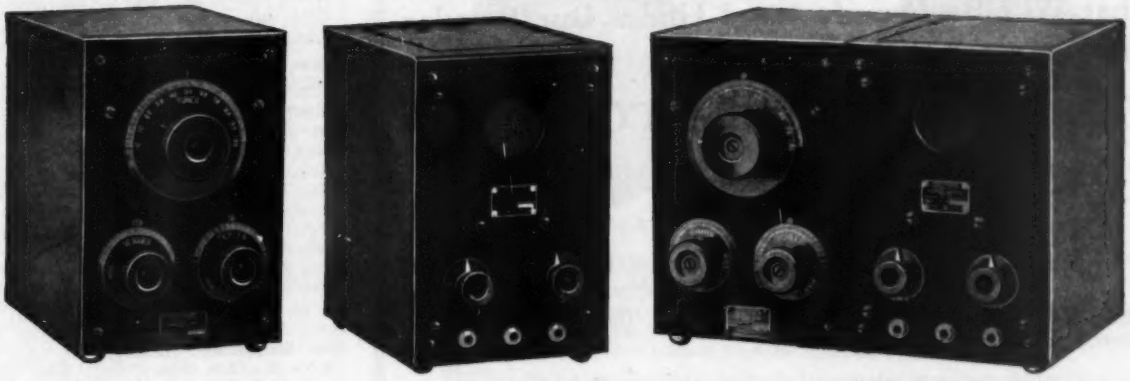
Now "Listen In"



Type RA Short-Wave Regenerative Tuner

Most novices begin with crystal detection and later use vacuum tubes. With this unit they can change from crystals to tubes. Only one adjustment is required to tune in the desired signal. The device responds to any wave length between 180 and 700 meters simply by turning a knob. An adjustable tickler coil permits the use of regenerative amplification with a vacuum tube detector unit (Type DA). This tuner can also be used with Type DB Crystal Detector. Hence the novice can begin with crystal detection and later use tubes and amplifiers with this unit. A fine tuning adjustment is provided by a single-plate condenser for tuning in "CW" stations, or for receiving broadcasted music, news, etc. Price $68.

Type DA Tube Detector and Two-Stage Amplifier

This unit enables the novice to pass from crystal to tube detection easily and naturally. It gives him a vacuum tube detector and two stages of audio frequency amplification. Filaments are controlled by two rheostats, one of which regulates the current to the detector tube and the other the current to the two amplifying tubes. Signals may be received either without amplification, with one stage, or with two stages of amplification merely by inserting a telephone plug in the proper jack. The unit should be used with Radiotrons UV-200 as a detector and UV-201 as amplifiers, although UV-201 may be used throughout. Price (less Radiotron tubes and telephone plug) $70.

Type RC Short-Wave Regenerative Receiver

This receiver combines in one cabinet Type RA Short-Wave Regenerative Tuner and Type DA Detector and Two-Stage Amplifier, described elsewhere on this page. Hence it meets the requirements of the **novice** or broadcasting enthusiast who wants a modern, compact, portable, efficient receiver which will enable him to hear distant stations. This is an ideal instrument for use with the loud-speaking Vocarola. Messages may be received with the detector alone or with one or two stage amplification. Used with a load-coil (Type CB) signals can be received on wave lengths up to 1,600 or 2,800 meters, depending on the antenna. Price (less Radiotron tubes) $132.50. Type CB Load-Coil can be supplied for $6.

There's News and Music in the Air

Some of the sets like the Aeriola Jr. and the Aeriola Sr. are so simple that even one who has no knowledge of electricity whatever can set them up and "listen in" to the messages and music sent by broadcasting stations or by enthusiastic radio novices. Other, more sensitive sets, described and illustrated on this page, can be operated after a few hours' experience. By connecting a Vocarola loud-speaker with the more efficient sets shown *the whole family* can "listen in."

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Stations Worked and Heard

(*Continued from page 69*)

8fn, 8bq, (8xd), 8qr, (8afz), 8bto, 8wo, 8bva, 8ft, 8bum, 8ii, 8zg, 9aja, 9amt, 9akc, (9ak), (9uu), 9cp, 9ajh, 9aaw, 9agr, 9awx, 9dbe.

Fones—(3adt), (3and), (3aqa), (3awi), (3bjg), (3aku), (3rw), 3alw, (3anu), (3aae), (3ms), 3ar, (3fs), (3ds), (3amw), (3fm), 3gb, 3uo, (3zo), 4gl, 8ii.

Canadian—3jl, 3bp, xf1.

8BXX, HOMER FORSCHNER, 7 Ford Ave., Norwalk, Ohio (March)

Spark—(2wb), 3arn, 3dm, (4ea), (4ez), 4gn, 5hk, 5oi, 8amz, 8arg, 8axc, 8axn, (8ayx), (8baz), 8bdy, 8boi, 8bvk, 8ft, (8jj), (8ty), (8uc), 8vh, (8wd), 8xa, 8xe, 9aaw, 9acn, (9afk), (9agr), 9ahz, 9ajb, (9ajh), 9amq, (9amt), 9anp, (9aqm), 9atn, (9ava), 9avp, (9awz), 9ays, (9aze), (9azf), (9bdc), 9bgh, 9bp, (9cs), (9deh), (9dgw), 9dio, 9dso, 9dzy, 9ev, (9fk), 9ki, 9lf, 9to, (9vl), Canadian 3bp.

CW—(1bkq), (1bqe), 1xm, (2eh), 2fp, 3bfu, 3bn, 4eh, 4ft, 4zc, 5do, 6xad, 8ago, 8aio, 8alt, 8awm, (8bmf), 8brl, 8cbj, 8cgy, (8co), 8jz, 8oz, (8xe), 9ajh, 9ate, (9aua), 9awb, 9brl, 9dky, 9il, (9qe), 9zl, Can., 3bp fone.

8ZAC, CLIFFORD H. GALLOWAY, Barnesville, Ohio (March)

Spark—lary, (1bdt), 1bgf, 1bkq, (1cz), 2aje, 2awf, 2by, 2om, (2wb), 2xk, (3ac), 3ajd, 3apa, 3arm, 3arn, 3auw, 3bjt, 3fb, (3hj), 3nb, 3pb, (3ta), (3ux), 3yb, 4as, 4be, 4bi, 4bq, (4cx), 4ea, 5aa, 5ew, 5gi, 5hk, 5jd, 5kc, 5sm, 5xa, 5xb, 5xu, 5zaa, 5zab, 7zm, 9aap, 9aaw, 9agq, (9agr), 9aig, 9amq, 9amt, 9anp, 9anq, 9arg, 9ask, 9avx, 9awz, 9aza, 9bp, 9dmj, 9drn, (9dso), 9dzi, 9ev, 9io, 9ki, 9lf, 9ms, (9ox), 9rc, 9uu, 9vl, 9wt, 9xi, 9xm, 9yo, 9zj, Canadian 3bp, 3cp, 3ea, (3ei), 3fo, (3gn).

CW—lary, 1bgf, 2bea, 2bml, 2fp, 2nz, (3aln), 3aqr, 3bfu, 3zy, 3zz, 4by, (4ft), 5jb, 5uu, 5za, 5zak, (6xad), 6zg, 6zz, 9aja, 9akr, 9ari, 9dws, 9ei, 9fm, 9qe, 9xi, 9zaf.

ROBERT SCHNEIDER, Springfield, Ohio (March)

CW—1ajp, 1ary, 1bcg, 1bgf, 2ajm, 2apd, 2ba, 2bea, 2beb, 2bnz, 2ccd, 2zk, 3aaz, 3aqr, 3bhl, 3ca, 3cc, 3fs, 3gl, 3il, 4as, 4bf, 4bq, 4bz, 4dc, 4du, 4gl, 4ii, 4by, 5ek, 5za, 8abv, 8acf, 8agj, 8ago, 8agp, 8ahh, 8ahs, 8ahr, 8aim, 8ain, 8aio, 8ajt, 8ajx, 8akc, 8alef, 8alf, 8alt, 8aqh, 8aqv, 8apf, 8ark, 8arl, 8avh, 8awn, 8axn, 8azh, 8bcl, 8bdb, 8bdo (fone), 8bex, 8bdu, 8bfx, 8bii, 8bjb, 8bk, 8bl, 8blm, 8blw, 8box, 8brl, 8btb, 8bu, 8byd, 8bzf, 8bzj(fone), 8bzy, 8cay, 8caz, 8cfd, 8cfs, 8cgl, 8cia, 8cko, 8cl, 8cld (fone), 8cua, 8cuc, 8dl, 8ge, 8gp, 8ii, 8iv, 8jm, 8kl, 8mp, 8oz, 8pc, 8qz, 8sp, 8uk, 8vj, 8vy, 8wi, 8xae, 8xak(fone), 8xc, 8yn(fone), 8za, 8zz, 9aap, 9aaw, 9ad, 9ago, 9aiv, 9akd, 9amo, 9ara, 9ark, 9aps, 9ayw, 9bfx, 9blo, 9brl, 9cfx, 9dun, 9dv, 9dyn, 9fc, 9if, 9io, 9lg, 9lq, 9pf, 9qe, 9qd, 9kt, (fone), 9uh, 9vx, 9zl, 9zq. Fones: Kdka, kof, kyw, wdy, wfj, wfo, wgy, wjz, wlk, wlw, wmh, wrk, wsh, wwj, wyd.

Spark—1adl, 1oon, 3aqr, 5al, 5da, 5hk, 8acb, 8ad, 8afd, 8afh, 8ah, 8aib, 8aiz, 8ajx, 8ajb, 8ano, 8aqm, 8ars, 8ar, 8atu, 8awu, 8axy, 8ayn, 8bbu, 8ben, 8bfi, 8blk, 8blw, 8bna, 8bu, 8by, 8cb, 8cdu, 8cfs, 8cnr, 8cgz, 8ctu, 8eb, 8ft, 8hf, 8hr, 8kh, 8od, 8rl, 8sp, 8uc, 8yn, 8yu, 8za, 8zaa, 9aaw, 9abr, 9acb, 9acn, 9agl, 9ain, 9air, 9amq, 9ams, 9amt, 9ano, 9aoj, 9apm, 9apv, 9aqm, 9asj, 9ask, 9atn, 9aza, 9azf, 9azh, 9bfx, 9by, 9bmn, 9cy, 9dcv, 9dgx, 9fd, 9ki, 9lf, 9mc, 9uh, 9vl 9yae, 9yq, 9zi, 9zj, 9zn.

Queries Answered

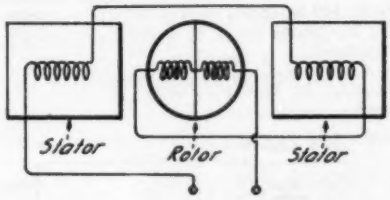
ANSWERS will be given in this department to questions of subscribers, covering the full range of wireless subjects, but only those which relate to the technical phases of the art and which are of general interest to readers will be published here. The subscriber's name and address must be given in all letters and only one side of the paper written on; where diagrams are necessary they must be on a separate sheet and drawn with India ink. Not more than five questions of one reader can be answered in the same issue. To receive attention these rules must be rigidly observed.

Positively no questions answered by mail.

E. F. S., Baltimore, Md.

Q. 1. One page 46 in "Practical Amateur Wireless Stations," Chapter XX, are directions for constructing variometers which I have carefully followed out, but I am at a loss to know just how to make the internal connections. There are four wire ends on the rotor and four on the stator. Now would you be so obliging as to draw in the connections on this diagram.

Ans. 1. Connect so that the current will pass through the two cells in the same direction as per diagram below so that it will not double lock upon itself.



Q. 2. Do grid and plate variometers connect alike.

Ans. 2. Grid and plate variometers are identical.

J. C. B., Candley, Pa.

Q.1. I am anxious to secure some information on the subject of sending messages under ground. This is a matter still in its infancy and it is hard to get ideas on the subject. I wish to experiment on same. Messages can easily be received from the ground which have been sent through the air, but what I have in mind is the method of sending under the ground with aerials.. Hope you have some books, or can tell me where I could procure same.

Ans. 1. Subject matter on this has not been published for general consumption, although articles have appeared in the radio magazines from time to time.

L. E., Rice, Kansas.

Q. 1. Are the slider rods on the tuning coil made of wood or metal?

Ans. 1. Metal.

Q. 2. If they are made of metal, what kind of metal must I use?

Ans. 2. Preferably brass.

Q. 3. What would be the size of aerial for this size set?

Ans. 3. One wire No. 14 copper bare about 100 to 150 feet long.

Q. 4. What kind of a phone should I use?

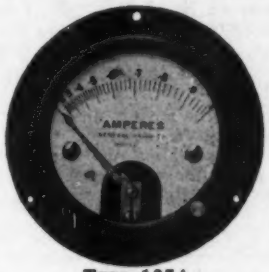
Ans. 4. A pair of 2000 ohms resistance of standard make.

F. L. G., Jamaica Plain, Mass.

Q. 1. I am very much interested in an article on page 38 of your March issue. I fail at present to see how one can get the required windings for coils within the space provided.

Ans. 1. See complete description of above article in April issue.

RADIO FREQUENCY AMMETERS



Type 127A

Type 127B

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E. L. M., Fairbault, Minn.

Q. 1. I wish to know how I can obtain the complete plans of the three-circuit receiving sets, that is, the correct method of making the coils, their size, the size wire, etc., also the distance it will receive.

Ans. 1. Many books contain the data you require. Suggest you get "Practical Amateur Wireless Stations" or "Wireless Experimenters' Manual," from Wireless Press, 326 Broadway, New York, or your local dealer.

E. K. M., Cleveland, Ohio.

Q. 1. On page 38, of THE WIRELESS AGE, for March, 1922, I notice an article entitled "Filament and Plate Current Direct from A. C. Supply." I wish to ask a few questions relative to same. Can this "stunt" be successfully used in connection with a three circuit regenerative receiving set?

Ans. 1. Yes, see April issue of THE WIRELESS AGE for additional information.

Q. 2. I also note that in the text of this article, in describing the construction of the transformer used, it states in part as follows: Secondary (high voltage) consists of 320 turns of No. 3 D. C. C." I feel that there must be an error regarding the size of the wire. Kindly state what size is meant.

Ans. 2. The correct size of wire is No. 32 D. C. C.

Q. 3. Also in giving dimensions of the transformer core, the article states: "Core: 4x5x1 inches." Do I understand that the 1 inch means the width of the core laminations or the height to which the core is built?

Ans. 3. You are correct; the width of each strip is one inch, also build up core to about one inch.

L. L., Elmira Heights, N. Y.
C. L. H., Westhaven, Conn.
H. A. J. C., Albany, N. Y.

All request information on Mr. Graff's article, page 38, March issue of THE WIRELESS AGE.

Ans. See additional information and descriptive matter in April issue of THE WIRELESS AGE.

V. C., Youngstown, Ohio

Q. 1. You recently gave a diagram for short wave reception, a copy of which is enclosed herewith. Is this known as the Armstrong?

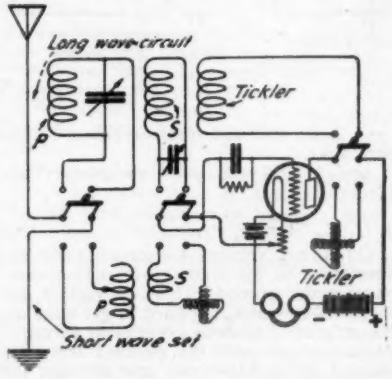
Ans. 1. Yes.

Q. 2. Using a regenerative receiver for wave lengths up to 600 meters, would the inductance unit shown herein be satisfactory for wave lengths from 600 to 15,000 meters (the advertised range), or would you advise the use of three separate coils on a three-coil mounting.

Ans. 2. Advise use of three coils on a three-coil mounting for best results. Three coils as shown would be O. K.

Q. 3. Will you please give me the proper connections for a set using the variocoupler, variometer method for short waves, and the honeycomb coil method for wave lengths from 600 to 15,000 meters, either by changing the phone plugs, or switches, or a combination?

Ans. 3. Here is your diagram.



Q. 4. Will this set receive from both damped and undamped stations? It is not clear to me what determines this. Is it the kind of detector, the type of tuning instruments, or what?

Ans. 4. Crystal will only receive damped and interrupted continuous waves. Vacuum tubes will receive damped and undamped waves. The vacuum tube is more desirable as stronger signals and greater distances are obtained from its use.

Q. 5. With approximately what degree of sensitivity is the C-300 superior to the crystal detector?

Ans. 5. Crystals and tubes vary in sensitiveness. As a general rule the vacuum tube is many times more sensitive than any crystal known so far.

Q. 6. My antenna will be approximately 80 feet long and 45 feet high, composed of four wire 2 feet apart. I wish to receive from nearly all of the coast stations and some ships—also broadcasting stations WJZ and KYW, using no amplification. Do you think I am expecting too much?

Ans. 6. You will probably be able to receive these stations O. K.. Weather conditions will play an important part, so it is rather uncertain.

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